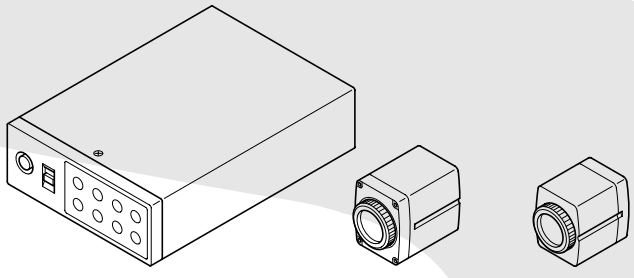
TOSHIBA

FILE NO. 210-200006

SERVICE MANUAL

CCD CAMERA

IK-TU51CU
JK-TU52H
JK-TU53H



IK-TU51CU JK-TU52H JK-TU53H

PRINTED IN JAPAN, Oct., 2000 Ⓢ

SAFETY NOTICE

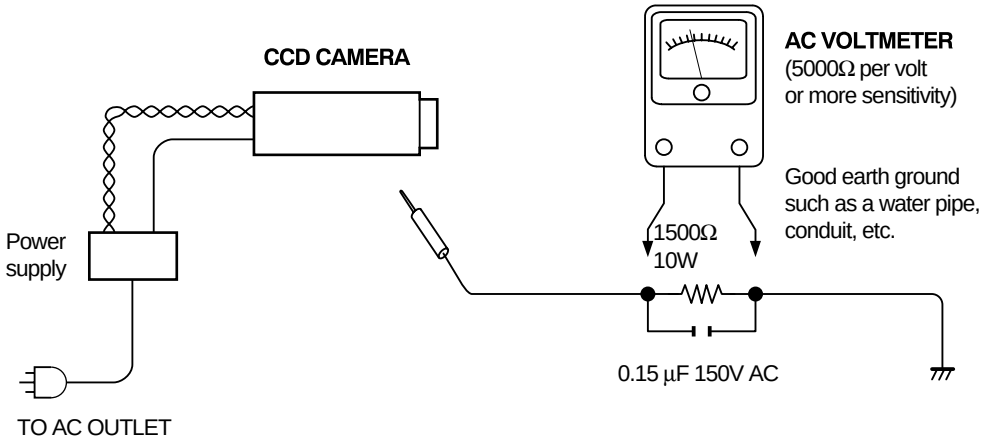
SAFETY PRECAUTIONS

LEAKAGE CURRENT CHECK

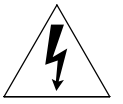
The AC line cord of power supply connect to terminal. And plug the AC line cord of power supply into a 120V AC outlet. Use an AC voltmeter, having 5000Ω per volt or more sensitivity.
Connect a 1500Ω 10W resistor, paralleled by a 0.15 μF 150V AC capacitor between a known good earth ground (water pipe, conduit, etc.) and all exposed metal parts of cabinet (screw heads etc.).

Measure the AC voltage across the 1500Ω resistor. The test must be conducted with the AC switch on and then repeated with the AC switch off. The AC voltage indicated by the meter may not exceed 0.3V. A reading exceeding 0.3V indicates that a dangerous potential exists, the fault must be located and corrected.
Repeat the above test with AC line reversed.
NEVER RETURN A CAMERA TO THE CUSTOMER WITHOUT TAKING NECESSARY CORRECTIVE ACTION.

READING SHOULD NOT EXCEED 0.3V



Test all exposed metal.
Voltmeter Hook-up for Leakage Current Check



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

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(IK-TU51CU)

SAFETY PRECAUTIONS

Read the following safety precautions carefully before using the product. These instructions contain valuable information on safe and proper use that will prevent harm and damage to the operator and other persons. Make sure that you fully understand the following details (indications, graphic symbols) before proceeding to the main descriptions in this manual.

Indication definitions

Indication	Meaning
⚠ Warning	This indicates that ignoring this label and/or misoperation of the product may cause serious personal injury or even death.
⚠ Caution	This indicates that ignoring this label and/or misoperation of the product may cause personal injury*1 and/or material damage*2.

Graphic symbol definitions

Symbol	Meaning
⊘	Indicates a prohibited action that must not be carried out. The actual prohibited action is indicated in the symbol or nearby graphically or described in text.
❗	Indicates a mandatory action that must be carried out surely. The actual mandatory action is indicated in the symbol or nearby graphically or described in text.

*1: Bodily injury means injuries, burns and electric shock which does not require hospitalization or prolonged treatment.

*2: Physical damage means extended harm to home, household effects.

⚠ Warning

- **Do not use the product when abnormality occurs.**
  The use in the abnormality status such as emitting smoke from the product, smelling burning, being damaged by drop, invasion of foreign objects inside the product, etc. , may cause fire and/or electric shock. Be always sure to disconnect the power plug from the electrical outlet (socket) at once and contact your dealer.

- **Do not install the product where splashing of water may occur, such as outdoor, a bathroom, etc.**
  This may cause fire and/or electric shock.

- **Do not repair, disassemble and/or modify by yourself.**
  This may cause fire and/or electric shock. Be always sure to contact your dealer for internal repair, check and cleaning of the product.

- **Keep the rated voltage for the product.**
  The use of power supply voltage except for its rated voltage may cause fire and/or electrical shock. Please refer to "5.CONNECTIONS".

- **Do not put a vessel(s) filled with a liquid (flower vase, etc.).**
  If a liquid enters the product, a fire and/or electric shock may occur.

- **Do not put the product in an unstable, slanting and/or vibrated place.**
  Drop and/or fail of the product may cause injury.

- **Do not touch power or TV antenna cords during a thunderstorm.**
  This might cacuse electric shock.

⚠ Caution

- **Keep the followings when installing.**
  - Do not put the product on a Inflammable material such as carpet or blanket.
  - Do not put the product in a narrow space, since the heat generated from the product may be difficult to emanate.
  - Do not put a inflammable material on the product.
    If you do not keep above, the heat generated by the product may cause fire.

- **Do not put the product in direct sunshine and/or high temperature.**
  The temperature rise inside the product may cause fire.

- **Do not put the product In a moist or dusty place such as a bathroom, a place close to a humidifier, etc.**
  This may cause fire and/or electric shock.

- **Do not put the product in a moist, soot and/or dusty place such as a kitchen, etc.**
  Do not put the product where a soot and steam may occur, such as a kitchen, etc. , or in a dusty place. This may cause fire and/or electric shock.

- **Do not shoot the sun with the lens and do not put the lens in the place exposed to an intensive light, such as the sunshine, etc.**
  Focusing of the light may cause injury of eye and/or fire.

- **Do not put the product in your mouse and do not swallow it.**
  This may cause suffocation and/or injury.

- **Ask your dealer to perform a periodical check and internal cleaning.**
  Dust inside the product may cause fire and/or trouble. For check and cleaning cost, please consult your dealer.

1. CAUTIONS ON USE AND INSTALLATION

●Carefully handle the units.

Do not drop, or give a strong shock or vibration to the camera. This may cause problems. Treat the camera cables carefully to prevent cable problems, such as cable breakdown and loosened connections.

●Do not shoot intense light.

If there is an intense light at a location on the screen such as a spot light, a blooming and smearing may occur.

When intense light enters, vertical stripes may appear on the screen. This is not a malfunction. Ghosts may occur when there is an intense light near the object. In this case, change the shooting angle.

●Install the camera in a location free from noise.

If the camera or the cables are located near power utility lines or a TV, etc. undesirable noise may appear on the screen. In such a case, try to change the location of the camera or the cable wiring.

●Moire

When thin stripe patterns are shooted, stripe patterns that are not actually there (moire) may appears as interference stripes. This is not a malfunction.

●Operating ambient temperature and humidity.

Do not use the camera in places where temperature and humidity exceed the specifications. Picture quality will lower and internal parts may be damaged.

Be particularly careful when using in places exposed to direct sunlight. When shooting in hot places, depending on the conditions of the object and the camera (for example when the gain is increased), noise in the form of vertical strips or white dots may occur. This is not a malfunction.

●Handling of the camera head and protection cap.

Keep the camera head and the protection cap away from children. Children may put them into mouth or swallow them accidentally. The protection cap protects the image sensing plane when the lens is removed from the camera head, do not throw away.

●When not using the camera for a longtime.

Turn off the camera power switch and stop supplying power.

●When cleaning the camera

Always turn off the power and make a cleaning with a piece of dry cloth. If necessary, gently wipe with a cloth dampened with thinned detergent. Do not use benzine, alcohol, thinner, etc. If used, coating and printed letters may be discolored. When cleaning the lens, use a lens cleaning paper, etc.

2. COMPONENTS

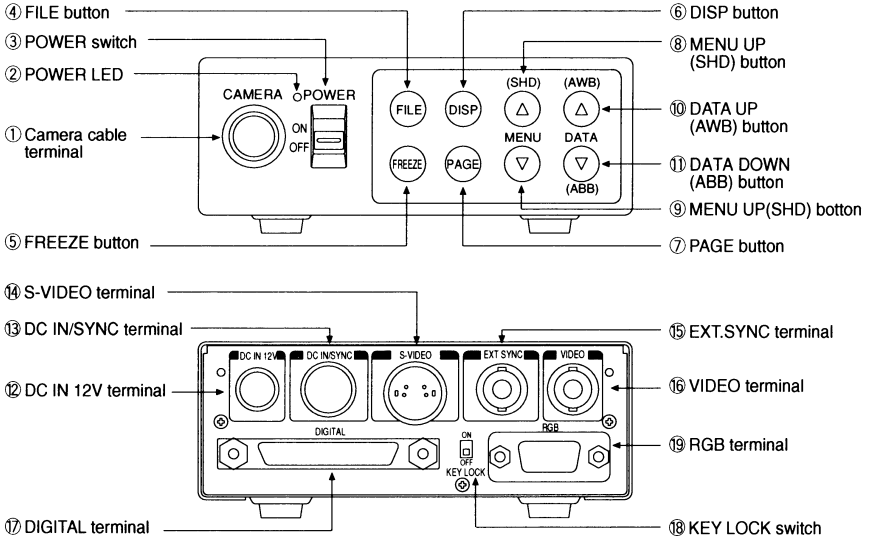
(1) Camera Control Unit 1
(2) Accessories
  (a) Instruction manual 1

3. ITEMS CONTROLLED BY USING ON SCREEN DISPLAY

	Item		Available selections	Preset value (Factory setting)	
Electronic shutter	MODE		AUTO, MANUAL, SS, EXT TRIG	MANUAL	
	EXT TRIG		1PULSE SNR, 1PULSE SR, 2PULSE, RS232C	1PULSE SNR	
	AUTO level		-100 — 0 — 100	0	
	AUTO peak/average		00 : 10 — 05 : 05 — 10 : 00	05 : 05	
	AUTO response speed		1 — 5 — 10	5	
	AUTO area		PRESET A, PRESET B, PRESET C, PRESET D, PRESET E, USER (USER area is possible to set in 64 zones)	PRESET A	
	MANUAL speed		OFF, 1/100s, 1/250s, 1/500s, 1/1000s, 1/2000s, 1/4000s, 1/10000s	OFF	
	Syncro. scan	FLD	1/525H to 260/525H, OFF, 1FRM to 255FRM	OFF	
		FRM	1/525H to 260/525H, OFF, 2FRM to 256FRM		
	Storage mode		FLD, FRM	FLD	
	Freeze operation		FRONT, TRIG ↑, TRIG ↓	FRONT	
	Trigger (1PULSE SNR/SR)		↑, ↓	↑	
	Trigger(2PULSE)		⊓⊓, ⊓⊓, ⊓⊓	⊓⊓	
	1PULSE exposure time		0.06ms to 16ms	16ms	
AUTO maximum gain			0dB to 20dB	10dB	
MANUAL gain			0dB to 20dB	0dB	
White balance	Color temperature		3200K, 5600K	3200K	
	AWB R PAINT		-10 — 0 — 10	0	
	AWB B PAINT		-10 — 0 — 10	0	
	AWB area		PRESET A, PRESET B, PRESET C, PRESET D, PRESET E, USER (USER area is possible to set in 64 zones)	PRESET A	
	ATW R PAINT		-10 — 0 — 10	0	
	ATW B PAINT		-10 — 0 — 10	0	
	MANUAL R GAIN		-100 — 0 — 100	0	
	MANUAL B GAIN		-100 — 0 — 100	0	
Gamma correction switching			ON, OFF	ON	
Gamma correction level			-10 — 0 — 10	0	
Black gamma			LOW, NORMAL, HIGH	NORMAL	
Two-dimension low pass Filter (2D LPF)			ON, OFF	OFF	
Detail gain			-7(OFF) — 0 — 7	0	
Detail boost frequency			LOW, NORMAL, HIGH	NORMAL	
Master pedestal			-50 — 0 — 50	0	
Chroma gain			-128 — 0 — 127	0	
Digital noise reduction(DNR)			ON, OFF	OFF	
Matrix color correction	Correction ON/OFF		ON, OFF	ON	
				JK-TU52H use	JK-TU53H use
	R hue		-15 — 0 — 15	0	0
	R gain		-15 — 0 — 15	0	0
	G hue		-15 — 0 — 15	3	0
	G gain		-15 — 0 — 15	3	0
	B hue		-15 — 0 — 15	0	0
	B gain		-15 — 0 — 15	2	-1
	Ye hue		-15 — 0 — 15	0	0
	Ye gain		-15 — 0 — 15	2	-1
	Cy hue		-15 — 0 — 15	0	0
	Cy gain		-15 — 0 — 15	0	0
	Mg hue		-15 — 0 — 15	0	0
	Mg gain		-15 — 0 — 15	0	0

Item		Available selections	Preset value (Factory setting)
Ext. Sync.	H phase adjustment	-100 — 0 — 100	0
	SC 0/180	0, 180	0
	SC phase adjustment	-128 — 0 — 127	0
OUTPUT	1	RGB, Y/P_R/P_B	RGB
	2	VBS, Y/C	VBS
Shading correction mode		SET, MANUAL, OFF	OFF
Manual shading correction		-128 — 0 — 127	0
RGB SYNC		G, ALL ON, ALL OFF	G
FREEZE DISP		ON, OFF	ON
Negative/Positive inversion		NEGA, POSI	POSI
Detail signal output		ON, OFF	OFF
RS232C baud rate		9600bps, 19200bps	9600bps

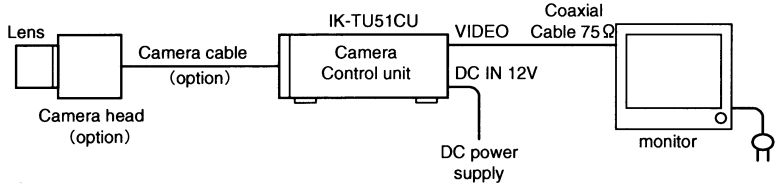
4. NAMES AND FUNCTIONS



①Camera cable terminal	The camera cable is connected.
②POWER LED	Lights when the power is turned on.
③POWER switch	Turns on or off the power supply.
④FILE button	Used when switching the scene files.
⑤FREEZE button	Used when switching to the freeze menu and when returning from the freeze menu to the camera menu.
⑥DISP button	Used when switching the display.
⑦PAGE button	Used when switching to the menu and when selecting the menus.
⑧MENU UP(SHD) button	Select the function to be confirmed or changed on the menu. (Also used when performing the auto shading correction.)
⑨MENU DOWN button	Select to confirm the function or to change the menu.
⑩DATA UP(AWB) button	Changes the value of the function selected by the MENU (UP/DOWN) button. (Also used when using AWB.)
⑪DATA DOWN (ABB) button	Changes the value of the function selected by the MENU (UP/DOWN) button. (Also used when using ABB.)
⑫DC IN 12V terminal	Accept a DC power input (12V).
⑬DC IN／SYNC terminal	HD and VD signals are input/output. When the random trigger operation is used, the trigger signal is input and the index signal is output.
⑭S－VIDEO terminal	Outputs Y (luminance) and C (color) signals.
⑮EXT. SYNC terminal	Used when the camera output signal is synchronized by the external signal. (BNC connector)
⑯VIDEO terminal	Outputs VBS output. Connected to a monitor, VTR, etc. (BNC connector)
⑰DIGITAL terminal	LVDS format digital video signal output and control signal input/output terminal. This terminal also includes an RS232C format external control pin.
⑱KEY LOCK switch	Enables/disables buttons ④ to ⑪.
⑲RGB terminal	Used as the connector terminal for Y/C or VBS output, RGB or Y/P_R/P_B output, and SYNC output.

5. CONNECTION

5. 1 Standard Connection



5. 2 Caution on Connection

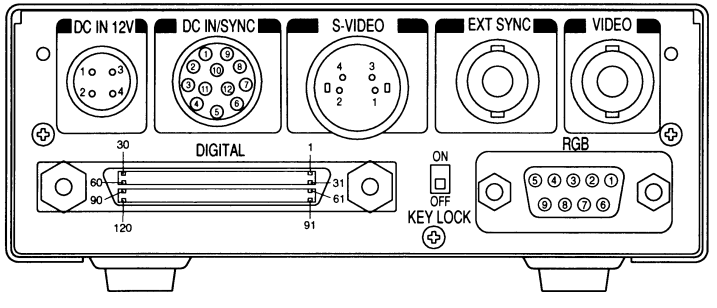
- Please use only optional camera heads model # JK-TU52H or JK-TU53H with this camera controller. Use of another head may cause damage.
- When connecting the camera cables, be sure to turn off the camera control unit and the other equipment connected.
- For DC power supply connecting to DC IN 12V terminal, use UL listed and/or CSA approved ungrounding type AC adaptor with the specifications described below.

Power supply voltage	:	DC12V±10%
Current rating	:	More than 830mA, Less than2.5A
Ripple voltage	:	Less than 50mV(p−p)
Connector	:	HR10A−7P−4S by HIROSE electronics Co. Ltd
		Pins 1, 2 : 12V
		Pins 3, 4 : GND

- If the screw on the camera connector portion of the camera cable looses, noise may appear on the screen. So be sure to tighten the connector fully.
- Please use optional camera head JK-TU52H or JK-TU53H exclusively. Using other camera head may cause trouble.

5. 3 Connection on Back Panel

Back panel view



5. 3A Connector Pin Assignments

DC IN 12V

1	+12V
2	+12V
3	GND
4	GND

DC IN/SYNC

1	GND
2	+12V
3	GND(for INDEX)
4	INDEX
5	GND(for HD)
6	HD OUT
7	VD OUT
8	GND(for TRIGGER)
9	TRIGGER
10	VD IN
11	HD IN
12	GND(for VD)

S-VIDEO

1	GND
2	GND
3	Y
4	C

RGB

1	GND(for VBS,Y/C)
2	GND(for R/G/B,Y/P_R/P_B)
3	R/P_R OUT
4	G/Y OUT
5	B/P_B OUT
6	VBS/Y OUT
7	SYNC OUT
8	GND(for SYNC)
9	-/C OUT

DIGITAL

1	R0 (+)	31	R0 (-)	61	GND	91	GND
2	R1 (+)	32	R1 (-)	62	PIXEL CLK (+)	92	PIXEL CLK (-)
3	R2 (+)	33	R2 (-)	63	FRAME EN (+)	93	FRAME EN (-)
4	R3 (+)	34	R3 (-)	64	FIELD ID (+)	94	FIELD ID (-)
5	R4 (+)	35	R4 (-)	65	LINE EN (+)	95	LINE EN (-)
6	R5 (+)	36	R5 (-)	66	TRIGGER D (+)	96	TRIGGER D (-)
7	R6 (+)	37	R6 (-)	67	RESERVE (OUT +)	97	RESERVE (OUT -)
8	R7 (+)	38	R7 (-)	68	GND	98	GND
9	R8 (+)	39	R8 (-)	69	GND	99	GND
10	R9 (+)	40	R9 (-)	70	NC	100	NC
11	G0 (+)	41	G0 (-)	71	NC	101	NC
12	G1 (+)	42	G1 (-)	72	NC	102	NC
13	G2 (+)	43	G2 (-)	73	NC	103	NC
14	G3 (+)	44	G3 (-)	74	NC	104	NC
15	G4 (+)	45	G4 (-)	75	NC	105	NC
16	G5 (+)	46	G5 (-)	76	NC	106	NC
17	G6 (+)	47	G6 (-)	77	NC	107	NC
18	G7 (+)	48	G7 (-)	78	NC	108	NC
19	G8 (+)	49	G8 (-)	79	NC	109	NC
20	G9 (+)	50	G9 (-)	80	NC	110	NC
21	B0 (+)	51	B0 (-)	81	NC	111	NC
22	B1 (+)	52	B1 (-)	82	NC	112	NC
23	B2 (+)	53	B2 (-)	83	NC	113	NC
24	B3 (+)	54	B3 (-)	84	NC	114	NC
25	B4 (+)	55	B4 (-)	85	GND	115	GND
26	B5 (+)	56	B5 (-)	86	GND	116	GND
27	B6 (+)	57	B6 (-)	87	TXD	117	NC
28	B7 (+)	58	B7 (-)	88	RXD	118	NC
29	B8 (+)	59	B8 (-)	89	GND	119	NC
30	B9 (+)	60	B9 (-)	90	GND	120	GND

* When using pins to remote (pins 87 to 89), please consult with your dealer.

Precautions on DIGITAL terminal :

- **Interference occurring inside the cable may accidentally activate the Trigger if the TRIGGER D inputs (pins 66 and 96) are open.**
  If the TRIGGER D input is not used, the TRIGGER D input pin should be either not connected or connected to RESERVE output pin (pins 67 and 97) ie: (connect pin 66 to pin 67 and pin 96 to 97).
- **The RESERVE pins (pins 67 and 97) are provided for an additional output. If unused they should be OPEN or connected to Trigger D.**
- **NC pins should be left OPEN.**

6. OPERATION

① Referring to the item " 5. CONNECTION", connect each equipment correctly.
② Turn on the connected equipment and the camera.
③ When using the camera for the first time and when replacing the camera cable and the camera head, be sure to operate the ABB adjustment in advance, referring to the item "6.1 Automatic Black Balance".
④ Facing the lens to the object, operate the lens iris adjustment, focus adjustment, etc.
⑤ Referring to the item "6.2 White Balance", operate the adjustment.
⑥ Referring to the items "6.3 Scene File, 6.4 Gain, 7. MODE SETTING BY ON SCREEN DISPLAY", select the necessary items.

6. 1 Automatic Black Balance

Black balance adjustment is necessary to get the correct black picture level.

- Close the lens iris.
- If the color bar pattern is displayed on the screen or if the index menu/menu is displayed, press the [DISP] button to disable the color bar pattern or the character display. If the camera is in Freeze Mode, perform the cancellation procedure (refer to the item "6.6 Freeze Operation") to return the camera to Live Image Mode.
- Hold the [DATA DOWN] button for approx. 1 second.
- When the black balance adjustment operation starts, the character ABB blinks on the screen.
- When the black balance adjustment operation finishes, the character ABB ends blinking and the result appears for approx. 1 second.

Display	Meaning
ABB OK	Automatic black balance adjustment finished correctly.
ABB NG CLOSE LENS	Automatic black balance adjustment cannot be performed because the lens iris is open. Close the lens iris.
ABB NG	Automatic black balance adjustment cannot be performed. Operate the automatic black balance again.

6. 2 White Balance

For the white balance adjustment for this unit, ATW (Automatic Trace White balance), AWB (Automatic White Balance) and MANUAL (Manual white balance) adjustments are provided. Referring to the items "7.2 (3) WHT BAL (White balance), 7. MODE SETTING BY ON SCREEN DISPLAY", select the desired mode.

	ATW (Automatic Trace White Balance)	AWB (Automatic White Balance)	MANUAL (Manual White Balance)
Outline	Camera measures the object color temperature and adjust the white balance automatically.	Adjust white balance by displaying the white object inside the area set by AWB menu and pressing the [DATA UP] button.	Adjust the white balance manually using the WHT BAL menu while shooting the white object.
Features	Traces variations of color temperature and adjusts the white balance automatically.	Measurement accuracy is higher than ATW. This mode is effective when shooting under less variations of color temperature.	Artificial white balance setting can be set. The manual adjustment is most effective under shooting condition with no color temperature variation.
Notes	If an illumination is low, white balance may not be corrected. When the shutter mode is EXT TRIG or long the long period exposure mode, ATW is not available.	When the shutter mode is EXT TRIG, AWB is not available.	Adjustment is performed by confirming with a vector scope.

① AWB(Automatic white balance)

- Set the MODE to AWB on the WHT BAL menu.
  Perform the C.TEMP (color temperature conversion) setting, if necessary.
  (Refer to the item "7.2 (3) WHT BAL (White balance)".)
  3200K: Appropriate for indoor shooting.
  5600K: Appropriate for outdoor shooting.
- If the color bar pattern is displayed on the screen or if the index menu/menu is displayed, press the [DISP] button to disable the color bar pattern or the character display on the menu. If the camera is in Freeze Mode, perform the cancellation procedure (refer to the item "6.6 Freeze Operation") to return the camera to Live Image Mode.
- Shoot a known white object entirely in the area set by the AWB menu (refer to the item "7.2 (3) (3.1) (d) Changing AWB zone area") and push [DATA UP] button for approx. 1 second.
- The character AWB blinks on the screen when the AWB starts.
- The character AWB ends blinking when the AWB finishes, and the result is displayed for approx. 1 second.

Display	Meaning
AWB OK	Automatic white balance adjustment finished correctly.
AWB NG **LEVEL LOW**	Automatic white balance adjustment cannot be performed because the video level is too low. Set the video level properly.
AWB NG **LEVEL HIGH**	Automatic white balance adjustment cannot be performed because the video level is too high. Set the video level properly.
AWB NG **C. TEMP LOW**	Automatic white balance adjustment cannot be performed because the color temperature is too low. If the C.TEMP is set to 5600K, set to 3200K. If the message appears with the C.TEMP set to 3200K, change the illumination or use a color temperature conversion filter.
AWB NG **C. TEMP HIGH**	Automatic white balance adjustment cannot be performed because the color temperature is too high. If the C.TEMP is set to 3200K, set to 5600K. If the message appears with the C.TEMP set to 5600K, change the illumination or use the color temperature conversion filter.
AWB NG **NOT AVAILABLE**	Automatic white balance adjustment cannot be performed because the shutter speed mode is EXT TRIG mode.
AWB NG	Automatic white balance adjustment cannot be performed for other reasons. Such as no white area is included in an object, etc.

② MANUAL(Manual white balance)

- Set the MODE to MANUAL on the WHT BAL menu.
  (Refer to the item "7.2 (3) WHT BAL (white balance)".)
- Shoot a known white object, adjust the white balance adjusting the levels of R GAIN and B GAIN on the menu, confirming with a monitor or a vector scope.
  (Refer to the item "7.2 (3) (3.3) Changing each setting in MANUAL mode".)

6. 3 Scene File

Three scene files (A, B, C) are available as user memories for this unit. These are selectable depending on shooting conditions. By using the [FILE] button, the camera operation is changed immediately from the currently selected Scene File to the next. (Refer to the item "7. MODE SETTING BY ON SCREEN DISPLAY".)

- While any menu is displayed, pressing the [FILE] button will display the menu settings for the next Scene File:

- When the [FILE] button is pressed while the camera is in live image mode, the current scene file selection at that time is displayed for approx. 3 seconds in the upper right corner of the screen. If the [FILE] button is pressed again while the position is displayed, the scene file cycles as described above.

6. 4 Gain

When the image is dark even if the lens iris is open, change the gain (video gain) to get the proper video level.
For the gain adjustment of the unit, AUTO (Automatic gain control), MANUAL (Manual), OFF (0 dB) modes are provided. Select the mode on the GAIN menu. (Refer to the item "7.2 (2) GAIN (Video gain)".)

① AUTO(Automatic gain control)

When the output is low, the gain is automatically adjusted to a suitable video level.
The maximum value of the gain is 20dB, and can be set from 0 to 20dB in 1dB steps. (Refer to the item "7.2 (2) (2.1) Changing the maximum gain in AUTO (Automatic gain control) mode".)
Video level (LEVEL), peak average value ratio (PEAK/AVE), and measurement light area (AREA) is same as the setting on the automatic shutter. (Refer to the item "7.2 (1) (1.1) Changing each setting in AUTO mode".)

② MANUAL(Manual gain)

Gain adjustment is performed on the GAIN menu. The adjustment range is from 0 to 20dB in 1dB steps.
(Refer to the item "7.2 (2) (2.2) Changing the gain in MANUAL mode".)

③ OFF

Gain is fixed at 0 dB.

6. 5 Shading Correction

Due to the lens used or the environmental condition, color shading may occur at the upper and lower side of the screen. In this case, the shading correction can decrease the color shading. For the shading correction of the unit, SET (Automatic shading correction), MANUAL (Manual shading correction), and OFF (no shading correction) modes are provided. Select the mode on the OPTION menu. (Refer to the item "7.2 (7) (7.3) Changing shading correction mode".)

① SET(Auto shading)

- When the shutter speed mode is set to EXT TRIG or the SS long period exposure mode, the automatic shading correction cannot be performed.
- If the color bar pattern is displayed on the screen or if the index menu/menu is displayed, press the [DISP] button to remove them from the screen. If the camera is in Freeze Mode, perform the cancellation procedure (refer to the item "6.6 Freeze Operation") to return the camera to Live Image Mode.
- Push the [MENU UP] button for approx. 1 second.
- When the automatic shading correction operation starts, the character SHD blinks on the screen.
- When the automatic shading correction operation terminates, the character SHD ends blinking and the result is displayed for approx. 1 second.

Display	Meaning
SHD OK	Automatic shading correction operation terminated correctly.
SHD OK LIMIT	Automatic shading correction operation terminated, however, the correction necessary exceeds the camera's range so the maximum possible value is applied.
SHD NG LEVEL LOW	Automatic shading correction cannot be performed because the video level is too low. Set the video level properly.
SHD NG LEVEL HIGH	Automatic shading correction cannot be performed because the video level is too high. Set the video level properly.
SHD NG NOT AVAILABLE	Automatic shading correction operation cannot be performed because the shutter speed mode is the EXT TRIG mode or the SS long period exposure mode.

② MANUAL(Manual Shading)

Perform the correction amount setting on the OPTION menu, confirming with a monitor or a vector scope. (Refer to the "7.2 (7) (7.4) Changing the manual shading correction setting".)

③ OFF

The status is no shading correction.

*** The shading correction is effective when the lens iris or zoom ratio is fixed. Use the unit with SHADING OFF for variable lens conditions.**

6. 6 Freeze Operation

- Freeze Mode Operation is only possible when no menu character display or color bar is on the screen.
- Freeze Mode Operation is not possible when the shutter mode is set to EXT TRIG.
- The method of toggling between Live Image Mode and Freeze Mode differs according to the shutter menu's FREEZE INPUT setting.
  - When set to FRONT : The mode is toggled using the FREEZE button on the front panel.
  - When set to TRIG ↑ : The mode is toggled at the rising edge of the trigger terminal input.
  - When set to TRIG ↓ : The mode is toggled at the falling edge of the trigger terminal input.
- When the OPTION menu's FREEZE DISP setting is set to ON, "FREEZE" is indicated at the upper right corner of the screen.
- During Freeze Mode Operation, the [DISP], [PAGE], [MENU UP], [MENU DOWN], [DATA UP], [DATA DOWN] and [FILE] buttons are disabled.

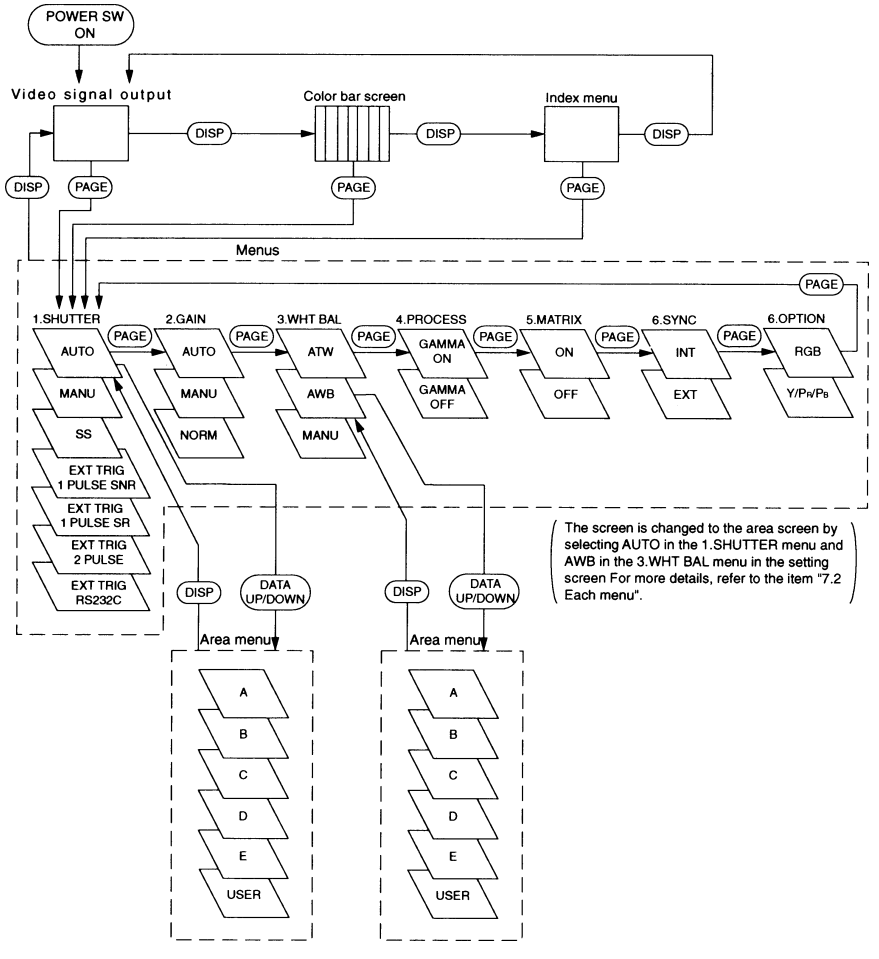
7. MODE SETTING BY ON SCREEN DISPLAY

Various settings can be controlled on the unit by using the on screen menu displayed on the monitor. The contents once set are memorized in the scene files (A, B, C) selected, so if the power turns off, it is unnecessary to set again when using the unit next time. When the setting is performed, select the menu of the item to be set.

7. 1 Using the Menues

When the power turns on, the normal screen showing only the video signal appears. Change the output to each screen (video signal output, color bar screen, Index menu, menus, and area menu) by using the [DISP], [PAGE], [MENU UP], and [MENU DOWN] buttons.

* A menu is selected when pushing the [PAGE] button after moving the "→" on the screen by the [MENU UP], [MENU DOWN] button while the Index menu is displayed.



7. 2 Menus

- Select the menu to change the setting by referring the item "7.1 Using the Menus".)
- When the [MENU UP], [MENU DOWN] buttons are pushed, the "→" on the screen moves up and down. Move the "→" to the item to change.

(1) SHUTTER (Electronic shutter)

The electronic shutter has four modes; AUTO, MANUAL, SS(Synchro. Scan), EXT TRIG(External trigger). Press the "Page" button to enter the Shutter Page. Use the "Data Up/Down" buttons to select the Shutter Mode.

AUTO ↔ MANUAL ↔ SS ↔ EXT TRIG

AUTO : The exposure time is controlled automatically to obtain the video level set.

MANUAL : It is possible to select the exposure time from eight speed settings; OFF (1/60s), 1/100s, 1/250s, 1/500s, 1/1000s, 1/2000s, 1/4000s, 1/10000s.

Note:

When setting a rapid shutter speed, sensitivity degrades according to the speed. When a discharging light such as fluorescent lamp, etc. is used for the illumination, the flicker may be large.

SS : Shutter speed can be set by the horizontal scanning time (1H) unit or by the frame unit.

EXT TRIG : Exposure is performed and images are output by external trigger. EXT TRIG includes the four modes described below. (For details of specifications, refer to the item "7.5 EXT TRIG (External trigger)".)

- ●1 PULSE SNR(1 Pulse Sync Non Reset)

  The charge begins to accumulate after the trigger pulse is received, and 1 field images are output according to the internal vertical sync signal timing. The exposure/accumulation time can be set from 0.06 to 16 ms. The trigger signal timing can be set to either the rising or falling edge.

- ●1 PULSE SR(1 Pulse Sync Reset)

  The charge begins to accumulate after the trigger pulse is received. Upon completion of accumulation the vertical sync signal is reset and 1 field images are output. The exposure/accumulation time can be set from 0.06 to 16 ms. The trigger signal timing can be set to either the rising or falling edge.

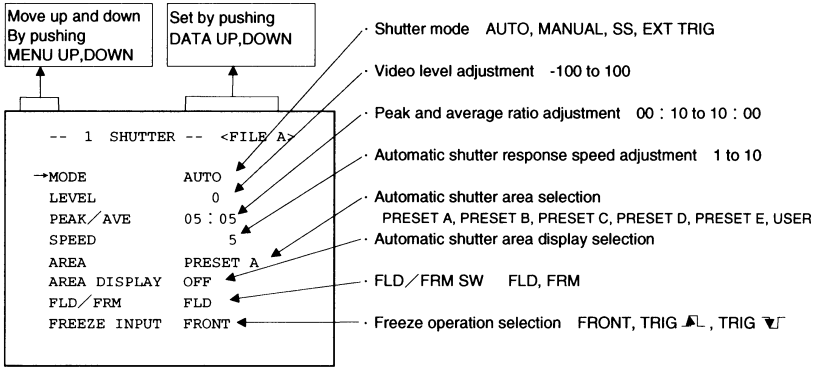
- ●2 PULSE

  The charge begins to accumulate after the trigger pulse is received. Upon completion of accumulation the vertical sync signal is reset and 1 fieid images are output. The exposure/accumulation time is the time from when the first trigger signal is taken in until the next trigger signal is taken in. The trigger signal intake timing can be set to one of three settings: rising edge, falling edge or pulse width (front and back edges of pulse).

- ●RS232C

  Accumulation of charges is started and ended by RS232C external control command input, and 1 field images are output without changing the vertical sync signal timing.

(1. 1) Changing each setting in AUTO mode


Move up and down By pushing MENU UP,DOWN
Set by pushing DATA UP,DOWN
-- 1 SHUTTER -- <FILE A>
→MODE AUTO
LEVEL 0
PEAK/AVE 05 : 05
SPEED 5
AREA PRESET A
AREA DISPLAY OFF
FLD/FRM FLD
FREEZE INPUT FRONT
· Shutter mode AUTO, MANUAL, SS, EXT TRIG
· Video level adjustment -100 to 100
· Peak and average ratio adjustment 00 : 10 to 10 : 00
· Automatic shutter response speed adjustment 1 to 10
· Automatic shutter area selection
PRESET A, PRESET B, PRESET C, PRESET D, PRESET E, USER
· Automatic shutter area display selection
· FLD/FRM SW FLD, FRM
· Freeze operation selection FRONT, TRIG ↑, TRIG ↓

< MODE = AUTO>

(a) Changing the video level in the automatic shutter mode

① Set the "→" to LEVEL by pushing [MENU UP], [MENU DOWN] buttons.

② Set the video level by pushing [DATA UP], [DATA DOWN] buttons.

→ The value increases by pushing [DATA UP]

-100 ◄⟷► 0 ◄⟷► 100

← The value decreases by pushing [DATA DOWN]

(b) Changing the automatic shutter detection (ratio between peak and average value)

① Set the "→" to PEAK/AVE by pushing [MENU UP], [MENU DOWN] buttons.

② Set the ratio between peak and average value by pushing [DATA UP], [DATA DOWN] buttons.

(Peak : Average) → The peak value increases by pushing [DATA UP]

00 : 10 ◄⟷► 05 : 05 ◄⟷► 10 : 00

← The peak value decreases by pushing [DATA DOWN]

(c) Changing the automatic shutter response speed

① Set the "→" to SPEED by pushing [MENU UP], [MENU DOWN] buttons.

② Set the response speed by pushing [DATA UP], [DATA DOWN] buttons.

→ The response speed becomes faster by pushing [DATA UP]

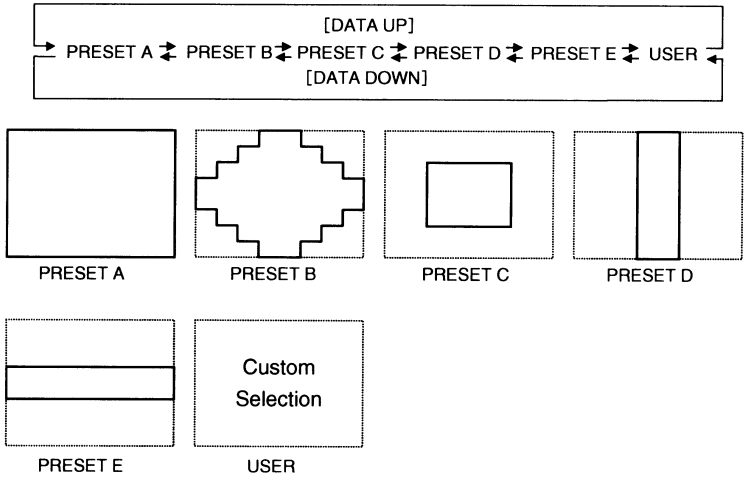
1 ◄⟷► 5 ◄⟷► 10

← The response speed becomes slower by pushing [DATA DOWN]

(d) Changing the automatic shutter zone area

① Set the "→" to AREA by pushing [MENU UP], [MENU DOWN] buttons.

② Set the measurement light area by pushing [DATA UP], [DATA DOWN] buttons.



(e) Confirming the contents of the measurement light area selected by the automatic shutter

① Set the "→" to AREA DISP by pushing [MENU UP], [MENU DOWN] buttons.

② Area screen appears by pushing [DATA UP], [DATA DOWN] buttons.

When AREA is set to USER, the setting can be changed on the area menu. When changing the area, refer to the item "7.2 (8) Setting USER area".

③ Push the [DISP] button to return to the menu.

(f) Changing the CCD storage mode

① Set the "→" to FLD/FRM by pushing [MENU UP], [MENU DOWN] buttons.

② Select either FLD (field) or FRM (frame) by pushing [DATA UP], [DATA DOWN] buttons.

(g) Changing the freeze operation setting

① Set the "→" to FREEZE INPUT by pushing [MENU UP], [MENU DOWN] buttons.

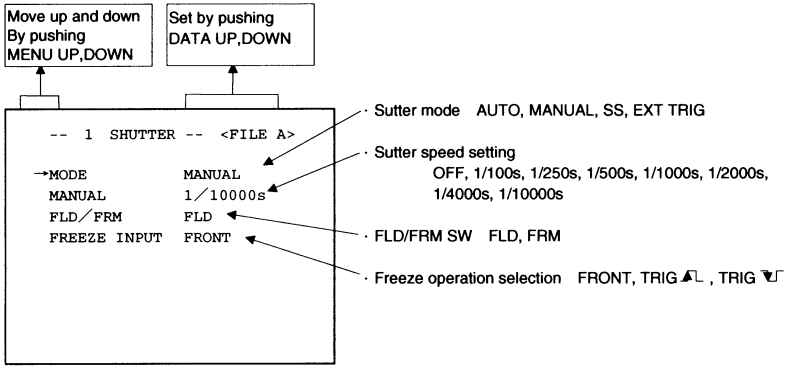
② Set the freeze operation by pushing [DATA UP], [DATA DOWN] buttons.

When set to FRONT : The Freeze Operation is performed by using the FREEZE button on the front panel.

When set to TRIG ↑ : The Freeze Operation is performed at the rising edge of the rear TRIG input.

When set to TRIG ↓ : The Freeze Operation is performed at the falling edge of the rear TRIG input.

(1. 2) Changing each setting in MANU mode


Move up and down By pushing MENU UP,DOWN
Set by pushing DATA UP,DOWN
-- 1 SHUTTER -- <FILE A>
→MODE MANUAL
MANUAL 1/10000s
FLD/FRM FLD
FREEZE INPUT FRONT
· Sutter mode AUTO, MANUAL, SS, EXT TRIG
· Sutter speed setting
OFF, 1/100s, 1/250s, 1/500s, 1/1000s, 1/2000s, 1/4000s, 1/10000s
· FLD/FRM SW FLD, FRM
· Freeze operation selection FRONT, TRIG ▲, TRIG ▼

< MODE = MANUAL>

(a) Changing the shutter speed

① Set the "→" to MANU by pushing [MENU UP], [MENU DOWN] buttons.

② Set the shutter speed by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶

OFF ⇄ 1/100s ⇄ 1/250s ⇄ 1/500s ⇄ 1/1000s ⇄ 1/2000s ⇄ 1/4000s ⇄ 1/10000s

⟵ [DATA DOWN]

(b) Changing the CCD storage mode

① Set the "→" to FLD/FRM by pushing [MENU UP], [MENU DOWN] buttons.

② Select either FLD (field) or FRM (frame) by pushing [DATA UP], [DATA DOWN] buttons.

(c) Changing the freeze operation setting

① Set the "→" to FREEZE INPUT by pushing [MENU UP], [MENU DOWN] buttons.

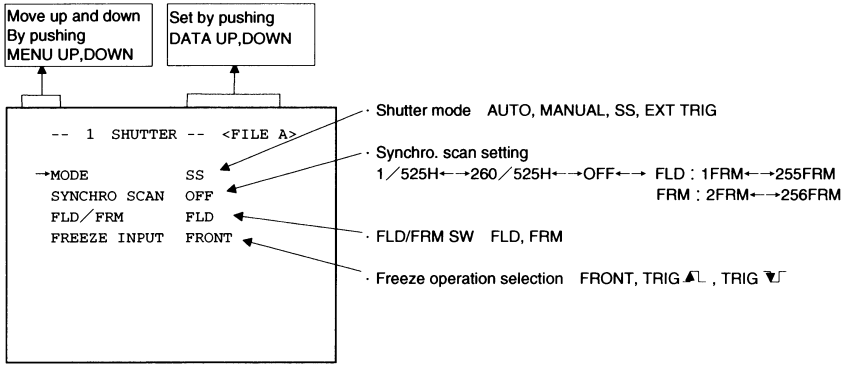
② Set the freeze operation by pushing [DATA UP], [DATA DOWN] buttons.

When set to FRONT : The Freeze Operation is performed by using the FREEZE button on the front panel.

When set to TRIG ▲ : The Freeze Operation is performed at the rising edge of the rear TRIG input.

When set to TRIG ▼ : The Freeze Operation is performed at the falling edge of the rear TRIG input.

(1. 3) Changing each setting in SS (synchro. scan) mode


Move up and down By pushing MENU UP,DOWN
Set by pushing DATA UP,DOWN
-- 1 SHUTTER -- <FILE A>
→MODE SS
SYNCHRO SCAN OFF
FLD/FRM FLD
FREEZE INPUT FRONT
· Shutter mode AUTO, MANUAL, SS, EXT TRIG
· Synchro. scan setting
1/525H←→260/525H←→OFF←→ FLD : 1FRM←→255FRM
FRM : 2FRM←→256FRM
· FLD/FRM SW FLD, FRM
· Freeze operation selection FRONT, TRIG ▲, TRIG ▼

< MODE = SS >

(a) Changing the shutter speed setting

① Set the "→" to SYNCHRO SCAN by pushing [MENU UP], [MENU DOWN] buttons.

② Select the shutter speed by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶

1/525H ⟷ 260/525H ⟷ OFF ⟷ 1FRM ⟷ 255FRM at FLD

2FRM 256FRM at FRM

⟵ [DATA DOWN] Long time exposure

(b) Changing the CCD storage mode

① Set the "→" to FLD/FRM by pushing [MENU UP], [MENU DOWN] buttons.

② Select either FLD (field) or FRM (frame) by pushing [DATA UP], [DATA DOWN] buttons.

(c) Changing the freeze operation setting

① Set the "→" to FREEZE INPUT by pushing [MENU UP], [MENU DOWN] buttons.

② Set the freeze operation by pushing [DATA UP], [DATA DOWN] buttons.

When set to FRONT : The Freeze Operation is performed by using the FREEZE button on the front panel.

When set to TRIG ▲ : The Freeze Operation is performed at the rising edge of the rear TRIG input.

When set to TRIG ▼ : The Freeze Operation is performed at the falling edge of the rear TRIG input.

Note:

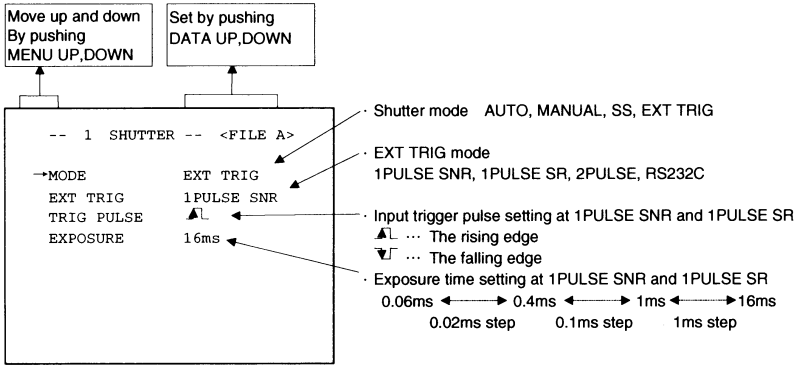
The longer the storage time with extended exposures, the more visible certain characteristics of CCD cameras become: fixed pattern noise, white pixels, etc.

(1. 4) Changing each setting in EXT TRIG mode

The EXT TRIG has four modes; 1PULSE SNR, 1PULSE SR, 2PULSE, RS232C.

First set the "→" to MODE and select EXT TRIG, then set the "→" to EXT TRIG and select the desired EXT TRIG mode.

(1. 4. 1) Changing each setting in 1PULSE SNR mode


Move up and down
By pushing
MENU UP,DOWN
Set by pushing
DATA UP,DOWN
-- 1 SHUTTER -- <FILE A>
→MODE EXT TRIG
EXT TRIG 1PULSE SNR
TRIG PULSE
EXPOSURE 16ms
· Shutter mode AUTO, MANUAL, SS, EXT TRIG
· EXT TRIG mode
1PULSE SNR, 1PULSE SR, 2PULSE, RS232C
· Input trigger pulse setting at 1PULSE SNR and 1PULSE SR
… The rising edge
… The falling edge
· Exposure time setting at 1PULSE SNR and 1PULSE SR
0.06ms ◄——► 0.4ms ◄——► 1ms ◄——►16ms
0.02ms step 0.1ms step 1ms step

< MODE = EXT TRIG EXT TRIG = 1PULSE SNR>

(a) Changing inputting trigger pulse setting

① Set the "→" to TRIG PULSE by pushing [MENU UP], [MENU DOWN] buttons.

② Select either ▲└ or ▼┌ by pushing [DATA UP], [DATA DOWN] buttons.

*** This setting is only valid in the 1PULSE mode (1PULSE SNR and 1PULSE SR). To make the trigger pulse setting when using the 2PULSE mode, first set the EXT TRIG mode to 2PULSE, then make the settings with the TRIG PULSE items.**

(b) Changing 1PULSE exposure time setting

① Set the "→" to EXPOSURE by pushing [MENU UP], [MENU DOWN] buttons.

② Set the exposure time by pushing [DATA UP], [DATA DOWN] buttons.

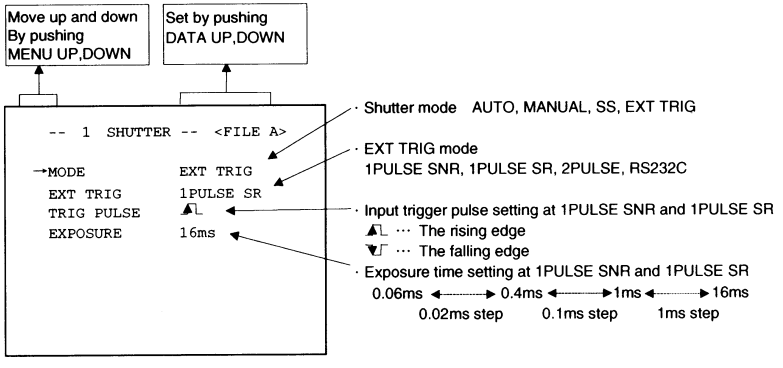
[DATA UP] ⟶

0.06ms ◄——► 0.4ms ◄——► 1ms ◄——► 16ms

(0.02ms step) (0.1ms step) (1ms step)

⟵ [DATA DOWN]

(1. 4. 2) Changing each setting in 1PULSE SR mode


Move up and down
By pushing
MENU UP,DOWN
Set by pushing
DATA UP,DOWN
-- 1 SHUTTER -- <FILE A>
→MODE EXT TRIG
EXT TRIG 1PULSE SR
TRIG PULSE
EXPOSURE 16ms
· Shutter mode AUTO, MANUAL, SS, EXT TRIG
· EXT TRIG mode
1PULSE SNR, 1PULSE SR, 2PULSE, RS232C
· Input trigger pulse setting at 1PULSE SNR and 1PULSE SR
… The rising edge
… The falling edge
· Exposure time setting at 1PULSE SNR and 1PULSE SR
0.06ms ◄——► 0.4ms ◄——► 1ms ◄——► 16ms
0.02ms step 0.1ms step 1ms step

< MODE = EXT TRIG EXT TRIG = 1PULSE SR>

(a) Changing inputting trigger pulse setting

① Set the "→" to TRIG PULSE by pushing [MENU UP], [MENU DOWN] buttons.

② Select either ▲└ or ▼┌ by pushing [DATA UP], [DATA DOWN] buttons.

*** This setting is only valid in the 1PULSE mode (1PULSE SNR and 1PULSE SR). To make the trigger pulse setting when using the 2PULSE mode, first set the EXT TRIG mode to 2PULSE, then make the settings with the TRIG PULSE items.**

(b) Changing 1PULSE exposure time setting

① Set the "→" to EXPOSURE by pushing [MENU UP], [MENU DOWN] buttons.

② Set the exposure time by pushing [DATA UP], [DATA DOWN] buttons.

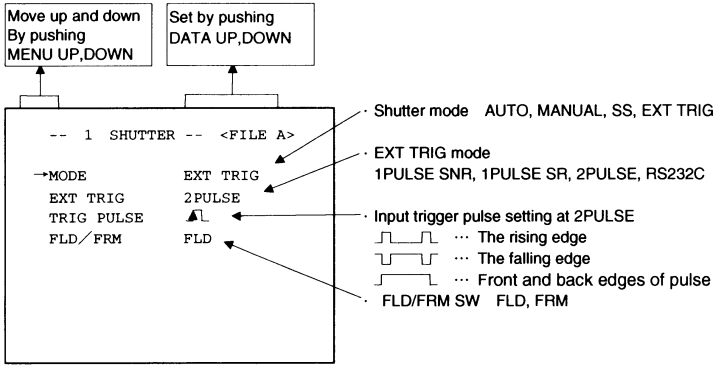
[DATA UP] ⟶

0.06ms ◄——► 0.4ms ◄——► 1ms ◄——► 16ms

(0.02ms step) (0.1ms step) (1ms step)

⟵ [DATA DOWN]

(1. 4. 3) Changing each setting in 2PULSE mode


Move up and down
By pushing
MENU UP,DOWN
Set by pushing
DATA UP,DOWN
-- 1 SHUTTER -- <FILE A>
→MODE EXT TRIG
EXT TRIG 2PULSE
TRIG PULSE
FLD/FRM FLD
· Shutter mode AUTO, MANUAL, SS, EXT TRIG
· EXT TRIG mode
1PULSE SNR, 1PULSE SR, 2PULSE, RS232C
· Input trigger pulse setting at 2PULSE
··· The rising edge
··· The falling edge
··· Front and back edges of pulse
· FLD/FRM SW FLD, FRM

< MODE = EXT TRIG EXT TRIG = 2PULSE>

(a) Changing inputting trigger pulse setting

① Set the "→" to TRIG PULSE by pushing [MENU UP], [MENU DOWN] buttons.

② Select either ⎍⎍ , ⎍⎍ or⎍⎍ by pushing [DATA UP], [DATA DOWN] buttons.

*** This setting is only valid in the 2PULSE mode. To make the trigger pulse setting when using the 1PULSE mode, first set the EXT TRIG mode to 1PULSE SNR or 1PULSE SR, then make the settings with the TRIG PULSE items.**

(b) Changing the CCD storage mode

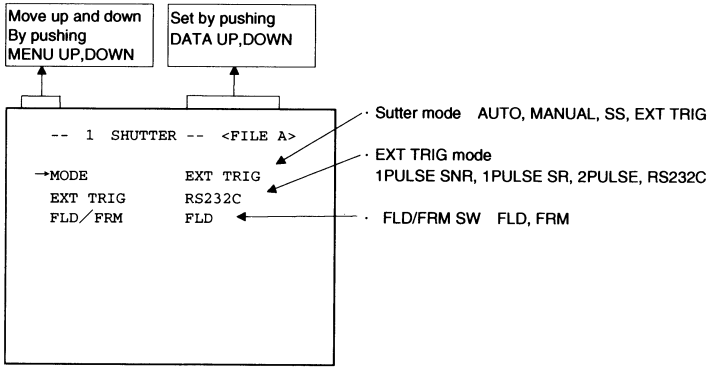
① Set the "→" to FLD/FRM by pushing [MENU UP], [MENU DOWN] buttons.

② Select either FLD (field) or FRM (frame) by pushing [DATA UP], [DATA DOWN] buttons.

Note:

The longer the storage time with extended exposures, the more visible certain characteristics of CCD cameras become: fixed pattern noise, white pixels, etc.

(1. 4. 4) Changing each setting in RS232C mode



< MODE = EXT TRIG EXT TRIG = RS232C>

(b) Changing the CCD storage mode

① Set the "→" to FLD/FRM by pushing [MENU UP], [MENU DOWN] buttons.

② Select either FLD (field) or FRM (frame) by pushing [DATA UP], [DATA DOWN] buttons.

Note:

The longer the storage time with extended exposures, the more visible certain characteristics of CCD cameras become: fixed pattern noise, white pixels, etc.

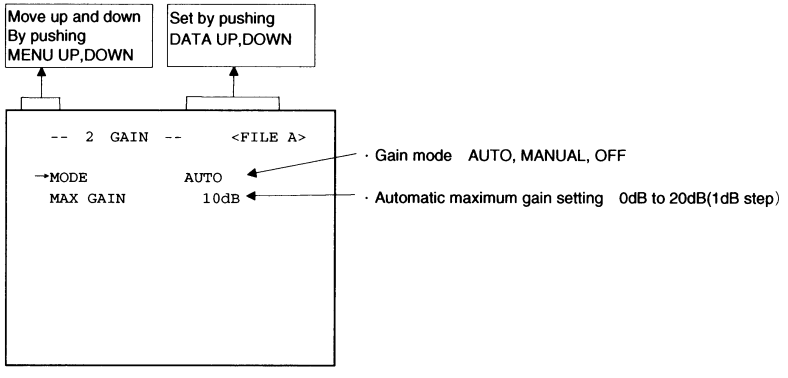
(2) GAIN (Video gain)

The GAIN has three modes; AUTO, MANUAL, OFF.

Set the "→" to MODE, push the [DATA UP], [DATA DOWN], and select mode among AUTO, MANUAL, OFF.

In the OFF mode, gain is fixed to 0dB.

(2. 1) Changing the maximum gain in AUTO (Automatic gain control) mode



① Set the "→" to MAX GAIN by pushing [MENU UP], [MENU DOWN] buttons.

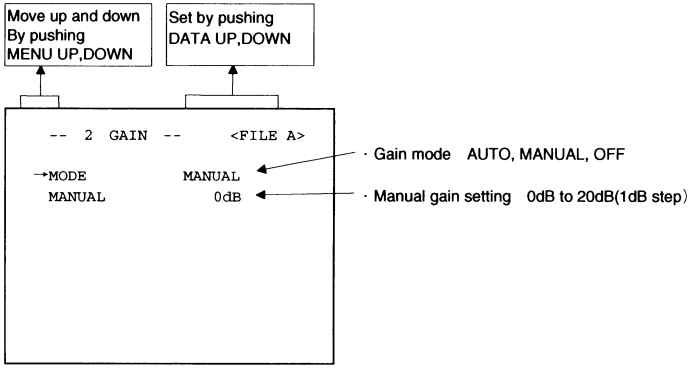
② Set the automatic maximum gain by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶

0dB ⟷ 20dB

⟵ [DATA DOWN]

(2. 2) Changing the gain in MANUAL mode



① Set the "→" to MANUAL by pushing [MENU UP], [MENU DOWN] buttons.

② Set the manual gain by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶

0dB ⟷ 20dB

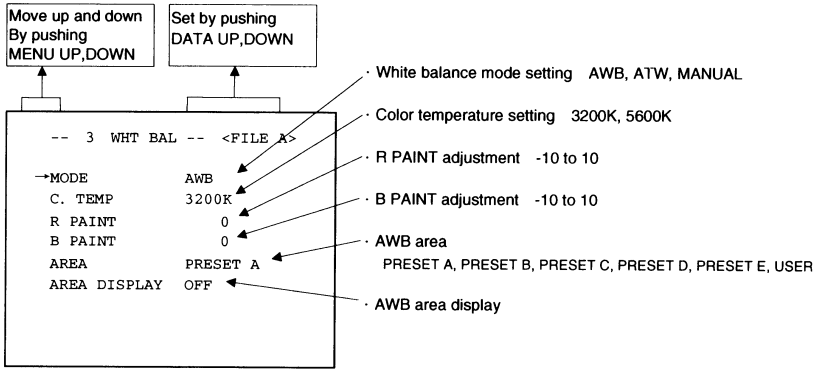
⟵ [DATA DOWN]

(3) WHT BAL(White balance)

The WHT BAL has three modes; AWB, ATW, MANUAL.

Set the "→" to MODE, push the [DATA UP], [DATA DOWN], and select mode among AWB, ATW, MANUAL.

(3. 1) Changing each setting in AWB(Automatic White Balance) mode


Move up and down
By pushing
MENU UP,DOWN
Set by pushing
DATA UP,DOWN
-- 3 WHT BAL -- <FILE A>
→MODE AWB
C. TEMP 3200K
R PAINT 0
B PAINT 0
AREA PRESET A
AREA DISPLAY OFF
· White balance mode setting AWB, ATW, MANUAL
· Color temperature setting 3200K, 5600K
· R PAINT adjustment -10 to 10
· B PAINT adjustment -10 to 10
· AWB area
PRESET A, PRESET B, PRESET C, PRESET D, PRESET E, USER
· AWB area display

(a) Changing color temperature setting

① Set the "→" to C.TEMP by pushing [MENU UP], [MENU DOWN] buttons.

② Select either 3200K or 5600K by pushing [DATA UP], [DATA DOWN] buttons.

(b) Changing R PAINT

① Set the "→" to R PAINT by pushing [MENU UP], [MENU DOWN] buttons.

② Set the red paint by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶ Red is increased.

−10 ⟷ 0 ⟷ 10

Red is decreased. ⟵ [DATA DOWN]

(c) Changing B PAINT

① Set the "→" to B PAINT by pushing [MENU UP], [MENU DOWN] buttons.

② Set the blue paint by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶ Blue is increased.

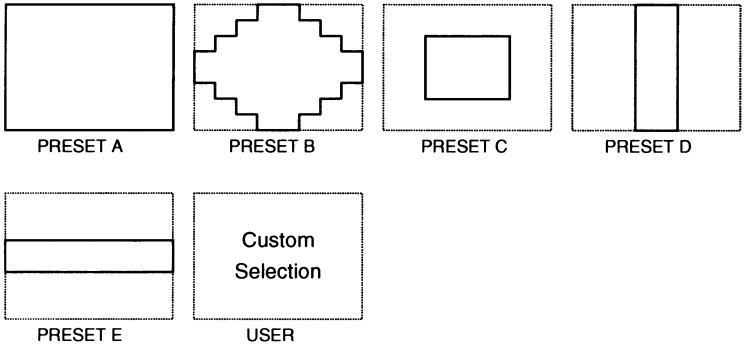
−10 ⟷ 0 ⟷ 10

Blue is decreased. ⟵ [DATA DOWN]

(d) Confirming the contents of the zone area selected by AWB

① Set the "→" to AREA DISP by pushing [MENU UP], [MENU DOWN] buttons.

② Select the area by pushing [DATA UP], [DATA DOWN] buttons.



(e) Confirming the contents of the zone area

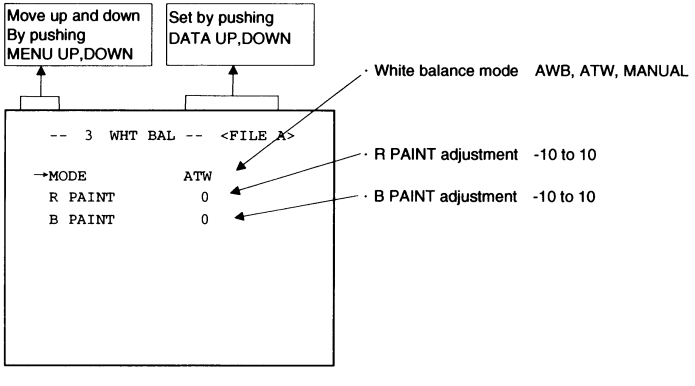
① Set the "→" to AREA DISP by pushing [MENU UP], [MENU DOWN] buttons.

② Area screen appears by pushing [DATA UP], [DATA DOWN] buttons.

When AREA is set to USER, the setting can be changed on the area menu. When changing the area, refer to the item "7.2 (8) Setting USER area".

③ Push the [DISP] button to return to the menu.

(3. 2) Changing each setting in ATW(Automatic Trace White Balance) mode



(a) Changing R PAINT

① Set the "→" to R PAINT by pushing [MENU UP], [MENU DOWN] buttons.

② Set the red paint by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶ Red is increased.

−10 ⟷ 0 ⟷ 10

Red is decreased. ⟵ [DATA DOWN]

(b) Changing B PAINT

① Set the "→" to B PAINT by pushing [MENU UP], [MENU DOWN] buttons.

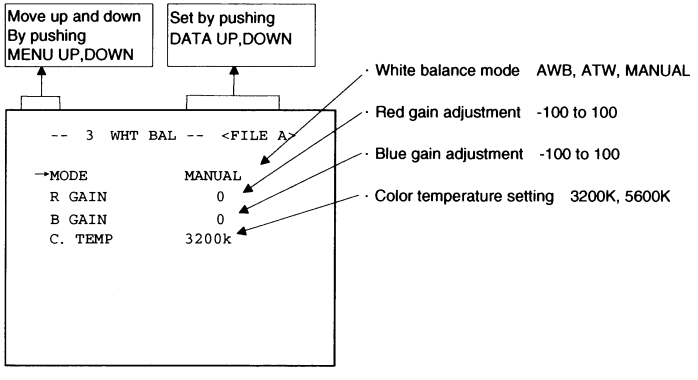
② Set the blue paint by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶ Blue is increased.

−10 ⟷ 0 ⟷ 10

Blue is decreased. ⟵ [DATA DOWN]

(3. 3) Changing the gain in MANUAL mode


Move up and down
By pushing
MENU UP,DOWN
Set by pushing
DATA UP,DOWN
· White balance mode AWB, ATW, MANUAL
· Red gain adjustment -100 to 100
· Blue gain adjustment -100 to 100
· Color temperature setting 3200K, 5600K
-- 3 WHT BAL -- <FILE A>
→MODE MANUAL
R GAIN 0
B GAIN 0
C. TEMP 3200k

(1) Changing the red gain

① Set the "→" to R GAIN by pushing [MENU UP], [MENU DOWN] buttons.

② Set the red gain by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶ Red is increased.

−10 ⟷ 0 ⟷ 10

Red is decreased. ⟵ [DATA DOWN]

(2) Changing the blue gain

① Set the "→" to B GAIN by pushing [MENU UP], [MENU DOWN] buttons.

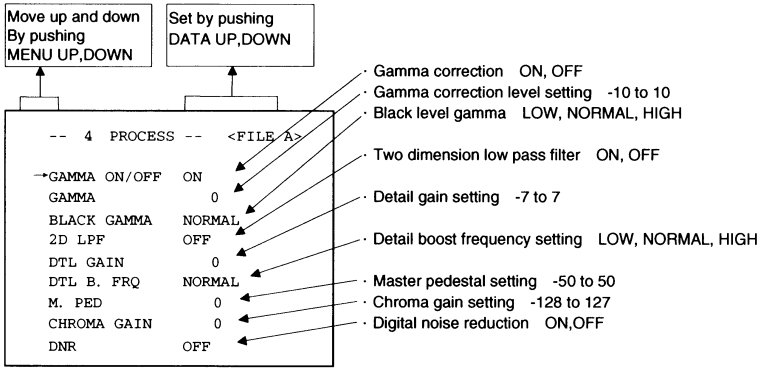
② Set the blue gain by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶ Blue is increased.

−10 ⟷ 0 ⟷ 10

Blue is decreased. ⟵ [DATA DOWN]

(4) PROCESS

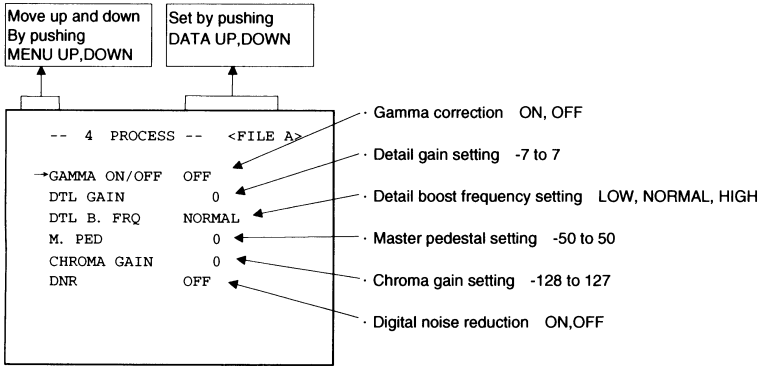

Move up and down By pushing MENU UP,DOWN
Set by pushing DATA UP,DOWN
-- 4 PROCESS -- <FILE A>
→GAMMA ON/OFF ON
GAMMA 0
BLACK GAMMA NORMAL
2D LPF OFF
DTL GAIN 0
DTL B. FRQ NORMAL
M. PED 0
CHROMA GAIN 0
DNR OFF
· Gamma correction ON, OFF
· Gamma correction level setting -10 to 10
· Black level gamma LOW, NORMAL, HIGH
· Two dimension low pass filter ON, OFF
· Detail gain setting -7 to 7
· Detail boost frequency setting LOW, NORMAL, HIGH
· Master pedestal setting -50 to 50
· Chroma gain setting -128 to 127
· Digital noise reduction ON,OFF

(4. 1) Changing the gamma correction ON/OFF

① Set the "→" to GAMMA ON/OFF by pushing [MENU UP], [MENU DOWN] buttons.

② Select either ON or OFF by pushing [DATA UP], [DATA DOWN] buttons.

When ON is selected, menu will show the GAMMA and BLACK GAMMA selections. When OFF is selected, GAMMA, BLACK GAMMA, and 2D LPF disappear. So the setting for GAMMA, BLACK GAMMA, and 2D LPF cannot be made. (2D LPF setting turns OFF.)


Move up and down By pushing MENU UP,DOWN
Set by pushing DATA UP,DOWN
-- 4 PROCESS -- <FILE A>
→GAMMA ON/OFF OFF
DTL GAIN 0
DTL B. FRQ NORMAL
M. PED 0
CHROMA GAIN 0
DNR OFF
· Gamma correction ON, OFF
· Detail gain setting -7 to 7
· Detail boost frequency setting LOW, NORMAL, HIGH
· Master pedestal setting -50 to 50
· Chroma gain setting -128 to 127
· Digital noise reduction ON,OFF

Menu when GAMMA OFF is selected.

(4. 2) Changing gamma correction level

① Set the "→" to GAMMA by pushing [MENU UP], [MENU DOWN] buttons.

② Set the gamma correction level by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶ Correction amount becomes larger.

−10 ⟷ 0 ⟷ 10

Correction amount becomes smaller. ⟵ [DATA DOWN]

*** When OFF is selected in GAMMA ON/OFF selection line, the display GAMMA turns off automatically. So the gamma correction level change cannot be changed.**

(4. 3) Changing black gamma correction level

① Set the "→" to BLACK GAMMA by pushing [MENU UP], [MENU DOWN] buttons.

② Select black gamma correction by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP]
LOW ⇄ NORMAL ⇄ HIGH
[DATA DOWN]

*** When OFF is selected in GAMMA ON/OFF selection line, the display BLACK GAMMA turns off automatically. So the black gamma correction level change cannot be changed.**

(4. 4) Changing two-dimension low pass filter

① Set the "→" to 2D LPF by pushing [MENU UP], [MENU DOWN] buttons.

② Select either ON or OFF by pushing [DATA UP], [DATA DOWN] buttons.

*** When ON is selected, the cross color noise in VBS output is reduced.**

Note:

Select OFF in step 2 described above when using signals other than the VBS output.

When OFF is selected in the GAMMA ON/OFF line or when DTL OUT ON is selected in the OPTION menu, the display 2D LPF turns off automatically. So 2D LPF change cannot be performed. (2D LPF is set to OFF.)

(4. 5) Changing detail (outline) gain

① Set the "→" to DTL GAIN by pushing [MENU UP], [MENU DOWN] buttons.

② Set the detail gain by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶ The detail increases.

−7 ⟷ 0 ⟷ 7

The detail decreases. ⟵ [DATA DOWN]

*** When DTL OUT ON is selected in OPTION menu, the display DTL GAIN turns off automatically. So DTL GAIN change cannot be performed.**

(4. 6) Changing detail boost frequency

① Set the "→" to DTL B.FREQ by pushing [MENU UP], [MENU DOWN] buttons.

② Set the detail boost frequency by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP]
LOW ⇄ NORMAL ⇄ HIGH
[DATA DOWN]

(4. 7) Changing master pedestal

① Set the "→" to M. PED by pushing [MENU UP], [MENU DOWN] buttons.

② Set the master pedestal by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶ M PED rises

−50 ⟷ 0 ⟷ 50

M PED decreases ⟵ [DATA DOWN]

*** When DTL OUT ON is selected in OPTION menu, the display M. PED turns off automatically. So the M. PED change cannot be performed.**

```
   --  4  PROCESS --    <FILE A>

 →GAMMA ON/OFF   ON
  GAMMA             0
  BLACK GAMMA    NORMAL
  DTL B. FRQ     NORMAL
  CHROMA GAIN       0
  DNR            OFF
```

```
   --  4  PROCESS --    <FILE A>

 → GAMMA ON/OFF    OFF
  DTL B. FRQ      NORMAL
  CHROMA GAIN        0
  DNR             OFF
```

Menu when DTL OUT ON is selected in OPTION menu.

(4. 8) Changing CHROMA GAIN

① Set the "→" to CHROMA GAIN by pushing [MENU UP], [MENU DOWN] buttons.

② Set the chroma gain by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶ Chroma gain increases.

−128 ⟷ 0 ⟷ 127

Chroma gain increases. ⟵ [DATA DOWN]

Note:

The chroma gain setting is only valid for VBS output signals and Y/C output signals. It is not valid for the RGB output in the RGB terminal, the Y/PR/PB outputs or the DIGITAL terminal's digital output signals.

(4. 9) Changing DNR (Digital Noise Reduction)

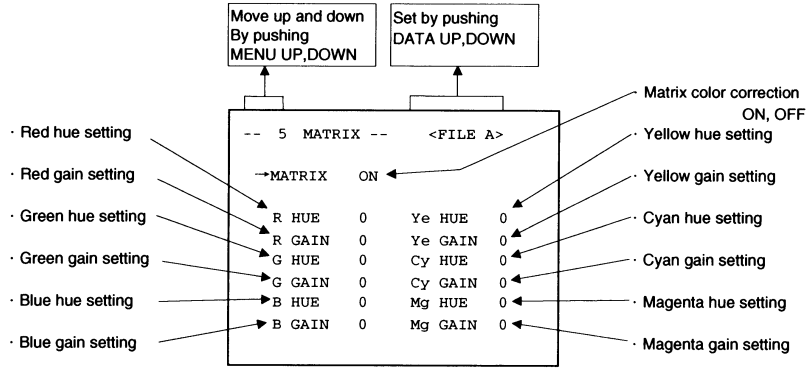
① Set the "→" to DNR by pushing [MENU UP], [MENU DOWN] buttons.

② Select either ON or OFF by pushing [DATA UP], [DATA DOWN] buttons.

Note:

When DNR is set to ON, noise is reduced, but the resolution decreases slightly.

(5) MATRIX(Matrix color correction)



(5. 1) Changing Matrix color correction ON/OFF

① Set the "→" to MATRIX by pushing [MENU UP], [MENU DOWN] buttons.

② Select either ON or OFF by pushing [DATA UP], [DATA DOWN] buttons.

(5. 2) Changing each color of MATRIX setting

① Set the "→" to the desired item by pushing [MENU UP], [MENU DOWN] buttons.

② Set the color by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶

−15 ⟷ 0 ⟷ 15

⟵ [DATA DOWN]

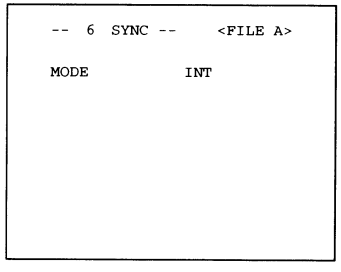
*** When matrix color correction is set to OFF, the setting indications turn off, so the color cannot be set.**

(6) SYNC

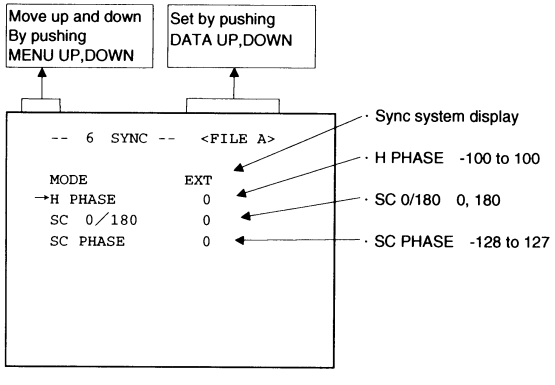
When an external sync signal is input, the display changes from INT (internal sync) to EXT (external sync) automatically.

INT ⟷ EXT

(6. 1) INT screen



(6. 2) Changing EXT setting


Move up and down By pushing MENU UP,DOWN
Set by pushing DATA UP,DOWN
-- 6 SYNC -- <FILE A>
MODE EXT
→H PHASE 0
SC 0/180 0
SC PHASE 0
· Sync system display
· H PHASE -100 to 100
· SC 0/180 0, 180
· SC PHASE -128 to 127

(a) Adjusting horizontal phase

① Set the "→" to H PHASE by pushing [MENU UP], [MENU DOWN] buttons.

② Adjust the horizontal phase by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶

−100 ⟷ 0 ⟷ 100

⟵ [DATA DOWN]

(b) Performing coarse adjustment of sub carrier phase

① Set the "→" to SC 0/180 by pushing [MENU UP], [MENU DOWN] buttons.

② Select either 0 or 180 by pushing [DATA UP], [DATA DOWN] buttons.

(c) Adjusting sub carrier phase

① Set the "→" to SC PHASE by pushing [MENU UP], [MENU DOWN] buttons.

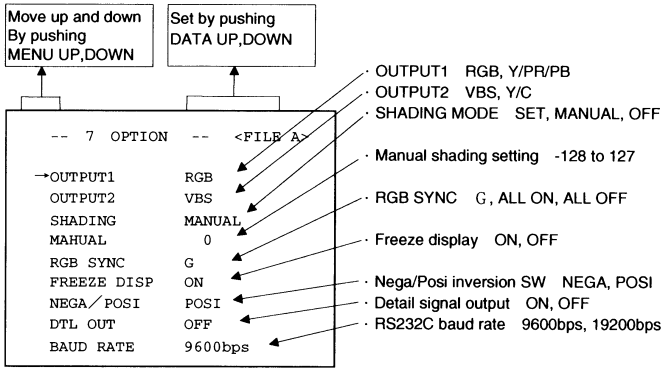
② Adjust the sub carrier phase by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶

−127 ⟷ 0 ⟷ 128

⟵ [DATA DOWN]

(7) OPTION


Move up and down By pushing MENU UP,DOWN
Set by pushing DATA UP,DOWN
-- 7 OPTION -- <FILE A>
→OUTPUT1 RGB
OUTPUT2 VBS
SHADING MANUAL
MAHUAL 0
RGB SYNC G
FREEZE DISP ON
NEGA/POSI POSI
DTL OUT OFF
BAUD RATE 9600bps
· OUTPUT1 RGB, Y/PR/PB
· OUTPUT2 VBS, Y/C
· SHADING MODE SET, MANUAL, OFF
· Manual shading setting -128 to 127
· RGB SYNC G, ALL ON, ALL OFF
· Freeze display ON, OFF
· Nega/Posi inversion SW NEGA, POSI
· Detail signal output ON, OFF
· RS232C baud rate 9600bps, 19200bps

(7. 1) Changing OUTPUT1 output

① Set the "→" to OUTPUT1 by pushing [MENU UP], [MENU DOWN] buttons.

② Select either RGB or Y/PR/PB by pushing [DATA UP], [DATA DOWN] buttons.

(7. 2) Changing OUTPUT2 output

① Set the "→" to OUTPUT2 by pushing [MENU UP], [MENU DOWN] buttons.

② Select either VBS or Y/C by pushing [DATA UP], [DATA DOWN] buttons.

(7. 3) Changing shading correction mode

① Set the "→" to SHADING by pushing [MENU UP], [MENU DOWN] buttons.

② Select SET, MANUAL or OFF by pushing [DATA UP], [DATA DOWN] buttons.

(7. 4) Changing manual shading correction mode

① Set the "→" to MANUAL by pushing [MENU UP], [MENU DOWN] buttons.

② Set manual shading correction by pushing [DATA UP], [DATA DOWN] buttons.

[DATA UP] ⟶

−127 ⟷ 0 ⟷ 128

⟵ [DATA DOWN]

*** When the shading correction mode is set to anything other than MANUAL, the display turns off, so the setting cannot be made.**

(7. 5) Changing RGB SYNC

① Set the "→" to RGB SYNC by pushing [MENU UP], [MENU DOWN] buttons.

② Select G, ALL ON or ALL OFF by pushing [DATA UP], [DATA DOWN] buttons.

*** When Y/PR/PB is selected at OUTPUT1, the display RGB SYNC turns off automatically. So RGB SYNC change cannot be performed.**

(7. 6) Changing FREEZE DISP setting

① Set the "→" to FREEZE DISP by pushing [MENU UP], [MENU DOWN] buttons.

② Select either ON or OFF by pushing [DATA UP], [DATA DOWN] buttons. When ON is selected, the word "FREEZE" appears on the frozen image.

(7. 7) Changing Negative/Positive inversion switch

① Set the "→" to NEGA/POSI by pushing [MENU UP], [MENU DOWN] buttons.

② Select either NEGA (negative) or POSI (positive) by pushing [DATA UP], [DATA DOWN] buttons.

(7. 8) Changing detail signal output

① Set the "→" to DTL OUT by pushing [MENU UP], [MENU DOWN] buttons.

② Select either ON (detail signal only is output) or OFF (video signal) by pushing [DATA UP], [DATA DOWN] buttons.

(7. 9) Changing RS232C communication baud rate

① Set the "→" to BAUD RATE by pushing [MENU UP], [MENU DOWN] buttons.

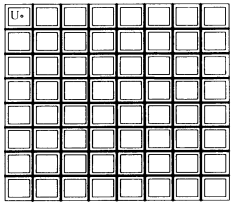
② Select either 9600bps or 19200bps by pushing [DATA UP], [DATA DOWN] buttons.

(8) Setting USER area

- When USER is selected for the AREA of the automatic shutter or for AWB, the light measurement zones can be changed.
- The USER area is composed of 64 zones with 8 (vertical) x 8 (horizontal) areas, and each area can be set to ON/OFF.

① Set the output to area menu.

Set the output to the area menu by referring to the item "7.2 (1.1) (e) Confirming the contents of the measurement light area selected by automatic shutter" and "7.2 (3.1) (e) Confirming the contents of the measurement light area selected by AWB".



② Move the "o" to the zone to be appeared.

The display "o" moves up, down, left and right by pushing [MENU UP], [MENU DOWN], [DATA UP], [DATA DOWN] buttons.

[MENU UP]
O
↑
[DATA DOWN]O ← O → O [DATA UP]
↓
O
[MENU DOWN]

③ Select ON/OFF for the zone.

Select ON (effective) or OFF (ineffective) by pushing [PAGE] button.

When ON is selected, the display "□" appears on the screen and when OFF is selected, "□" turns off.

④ Push [DISP] button to return to the menu.

Note:

When OFF is selected for all 64 zones, the automatic shutter function and AWB function are not performed correctly. So do not select OFF for all.

(9) Setting to factory setting status

The contents set of each scene file can be returned to the factory default status (preset status).

(1) Select a file to set to the factory default status by [FILE] button.

(2) If the color bar pattern or characters are displayed on the screen, press the [DISP] button to disable the color bar pattern and character display. If the camera is in Freeze Mode, perform the cancellation procedure (refer to the item "6.6 Freeze Operation") to return the camera to Live Image Mode.

(3) Push [MENU DOWN] and [DATA DOWN] buttons simultaneously for approx. 1 second.

(4) The preset operation starts. When the preset operation finishes, the character PRESET OK is displayed for approx. 1 second.

7. 3 External Sync

When using the unit with an external sync signal, input VBS (composite video signal) or BS to EXT. SYNC terminal on the rear panel, or input HD and VD to DC IN/SYNC terminal. When the external sync signal is input, the camera automatically switches its sync from the internal sync to the external sync.

The operation is as shown below, depending on the unit's status and how external sync signals are input.

Unit's status	HD input	VD input	EXT. SYNC input	Operation
Shutter mode : EXT TRIG EXT TRIG : 1PULSE SR or 2PULSE	On	–	Off	Internal sync
	On	–	Off	External sync with HD (Only for H sync with HD)
	Off	–	VBS	External sync with VBS (H sync with HSYNC and SC sync)
	Off	–	SYNC	H sync with HSYNC
	On	–	VBS or SYNC	Prohibited *1
Others	On	On	Off	External sync with HD, VD (H · V sync with HD, VD)
	Off	Off	VBS	External sync with VBS (H · V sync and SC sync with H SYNC, V SYNC)
	Off	Off	SYNC	External sync with SYNC (H · V sync with H SYNC, V SYNC)
	Off	On	Off	External sync with VD (Only for VD reset)
	On	Off	Off	External sync with HD (Only for H sync with HD)
	Off	On	VBS or SYNC	Prohibited *1
	On	Off	VBS or SYNC	Prohibited *1
	On	On	VBS or SYNC	Prohibited *1

Note : Don't use combination *1.

– : Don't care.

(1) External sync signal input conditions

VBS, BS	: SYNC section	0.286 ±0.1V
(75 Ω unbalanced)	Burst section	0.286 ±0.1V
HD	: 2 to 5V (p-p)	Negative
VD	: 2 to 5V (p-p)	Negative

(2) External sync frequency range

(External sync with VBS, SYNC)

For NTSC standard frequency : Within ±50ppm

(External sync with HD, VD)

For EIA standard frequency : Within ±1% (at horizontal sync frequency)

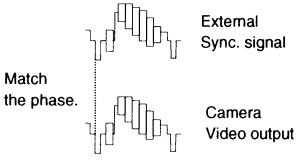
(3) Using the unit with external sync signal

Adjust H (horizontal) phase and SC (sub carrier) phase if necessary to match the output of multiple cameras.

When adjusting H (horizontal) phase and SC (sub carrier) phase, refer to the item "7.2 (6) SYNC".

(3. 1) H (horizontal) phase adjustment

Observe the external sync signal and the video signal output waveform of the unit with a dual trace oscilloscope, and adjust H phase so that the H phases match.



(3. 2) SC (Sub carrier) phase adjustment

When using the unit with external sync, the sub carrier signal phase of the video output signal of the unit can be adjusted. Perform a coarse adjustment for 0° and 180° in SC 0/180 and then perform a fine adjustment in SC PHASE. Using a vector scope for the phase adjustment will provide more accuracy.

7. 4 Synchro. Scan Operation

The shutter speed can be set by the horizontal scanning period (1H) or by the frame. Also, CCD integration mode can be set.

(1) Setting by 1H

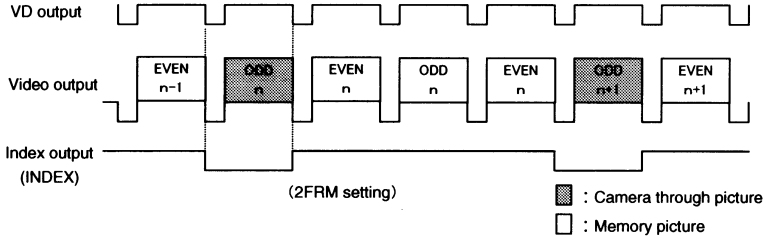
260/525H to 1/525H stands for the setting by the 1H and the shutter speed can be set by the 1H (63.56ms).

(2) Setting by the frame

1FRM to 255FRM (at field storage) and 2FRM to 256FRM (at frame storage) stand for the setting (long period exposure) by the frame.

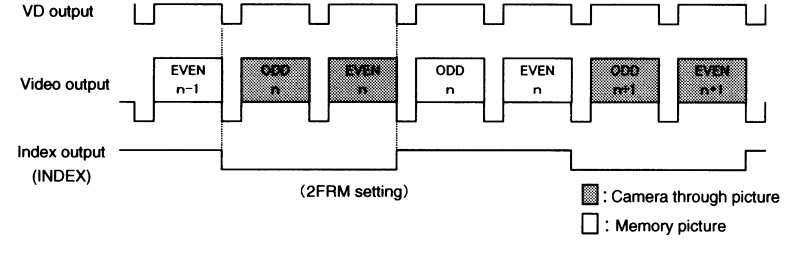
(a) Field storage period

The video signal stored during the frame period set is output as 1 field video image at a frame interval specified. Images stored in the memory are output until the following image output operation is performed.



(b) Frame storage period

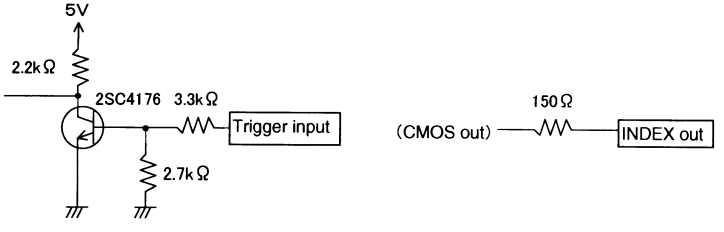
The video signal stored during the frame period set is output as 1 frame video image in a frame interval. Images stored in the memory are output until the following image output operation is performed.



7. 5 EXT TRIG (External trigger)

Charge begins to accumulate after the trigger input operation (in the RS232C mode, by RS232C command input, in other modes, by trigger pulse (TRIGGER) input to the DC IN/SYNC terminal) or trigger signal input to the DIGITAL terminal and 1 field or 1 frame images are output. There are four modes: 1PULSE SNR, 1PULSE SR, 2PULSE and RS232C.

The DC IN/SYNC terminal trigger input and index output interface are as shown below.

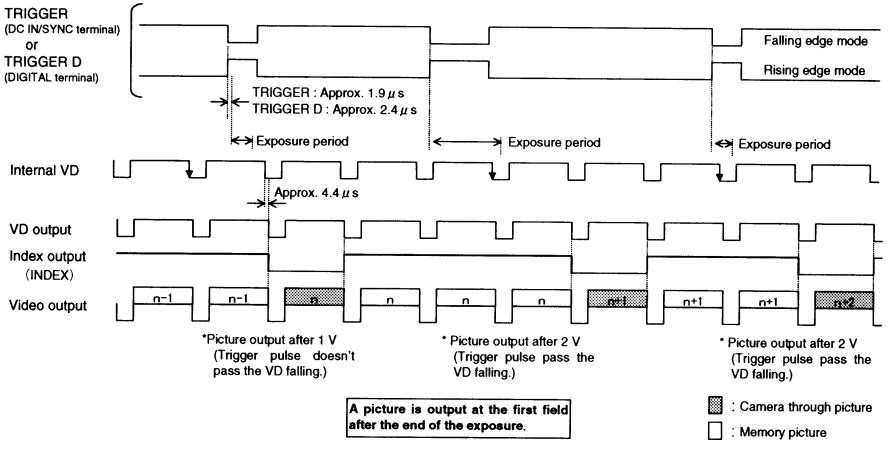


(1) 1 PULSE SNR (1 Pulse Sync Non Reset)

Charge begins to accumulate after the trigger input operation to the DC IN/SYNC terminal or trigger signal input (LVDS) to the DIGITAL terminal and 1 field images are output.

The exposure time is set to 0.06 to 16 ms on the menu.

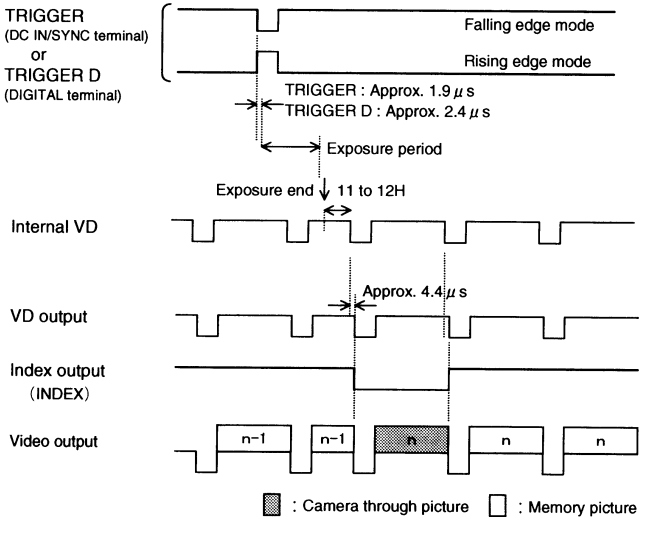
Trigger pulse level (DC IN/SYNC terminal)	: (Low Level) : Less than 0.5V , (High Level) : 3.4V to 5V
Trigger pulse fetch timing	: Rising edge / Falling edge selectable
Trigger pulse width	: More than 2 μs
Trigger pulse interval	: More than 50ms


TRIGGER (DC IN/SYNC terminal) or TRIGGER D (DIGITAL terminal)
Falling edge mode
Rising edge mode
TRIGGER : Approx. 1.9 μs
TRIGGER D : Approx. 2.4 μs
Exposure period
Exposure period
Exposure period
Internal VD
Approx. 4.4 μs
VD output
Index output (INDEX)
Video output
n-1
n
n+1
n+2
*Picture output after 1 V (Trigger pulse doesn't pass the VD falling.)
* Picture output after 2 V (Trigger pulse pass the VD falling.)
* Picture output after 2 V (Trigger pulse pass the VD falling.)
A picture is output at the first field after the end of the exposure.
: Camera through picture
: Memory picture

(2) 1 PULSE SR(1 Pulse Sync Reset)

Charge begins to accumulate after the trigger input operation to the DC IN/SYNC terminal or trigger signal input (LVDS) to the DIGITAL terminal, the vertical sync signal is reset and field images are output. The exposure time is set to 0.06 to 16 ms on the menu.

Trigger pulse level : (Low Level): Less than 0.5V , (High Level): 3.4V to 5V
(DC IN/SYNC terminal)
Trigger pulse fetch timing : Rising edge / Falling edge selectable
Trigger pulse width : More than 2 μs
Trigger pulse interval : More than 33.5 ms



(3) 2PULSE

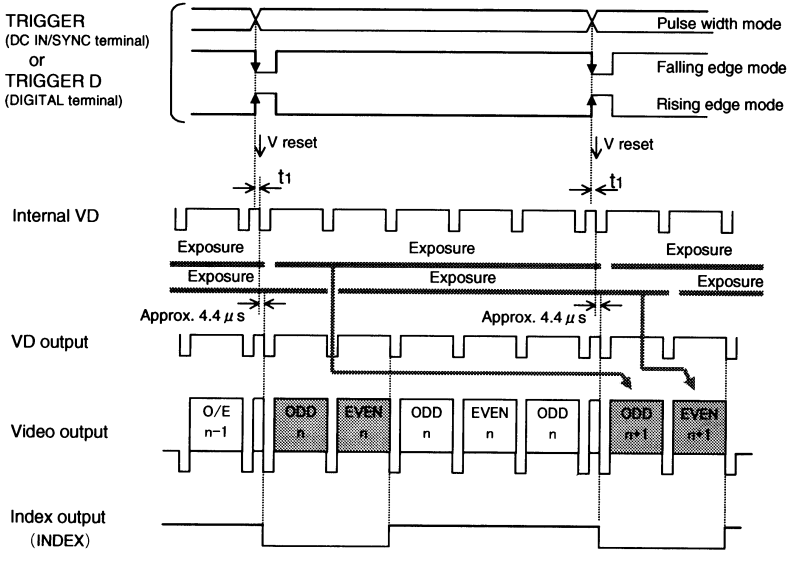
Accumulation of charges is started and ended through the trigger pulse input to the DC IN/SYNC terminal or trigger signal input (LVDS) to the DIGITAL terminal, the vertical sync signal is reset and field images are output.

Trigger pulse level : (Low Level): Less than 0.5V , (High Level): 3.4V to 5V
(DC IN/SYNC terminal)
Trigger pulse fetch timing : Rising edge / Falling edge / Pulse width selectable

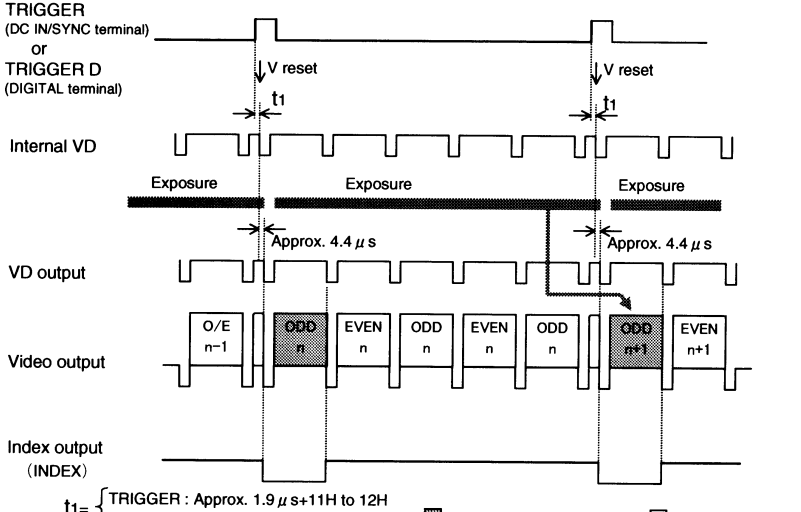
・When the trigger pulse fetch timing is set to pulse width
Trigger pulse width : More than 16.7ms(FLD/FRM setting: FLD)
More than 33.4ms(FLD/FRM setting: FRM)
Trigger pulse interval : More than 16.7ms(FLD/FRM setting: FLD)
More than 33.4ms(FLD/FRM setting: FRM)

・When the trigger pulse fetch timing is set to rising edge or falling edge
Trigger pulse width : More than 2 μs
Trigger pulse interval : More than 16.7ms(FLD/FRM setting: FLD)
More than 33.4ms(FLD/FRM setting: FRM)

(Frame storage period)



(Field storage period)



t_1= { TRIGGER : Approx. 1.9 μs+11H to 12H
TRIGGER D : Approx. 2.4 μs+11H to 12H

▨ : Camera through picture □ : Memory picture

(4) RS232C

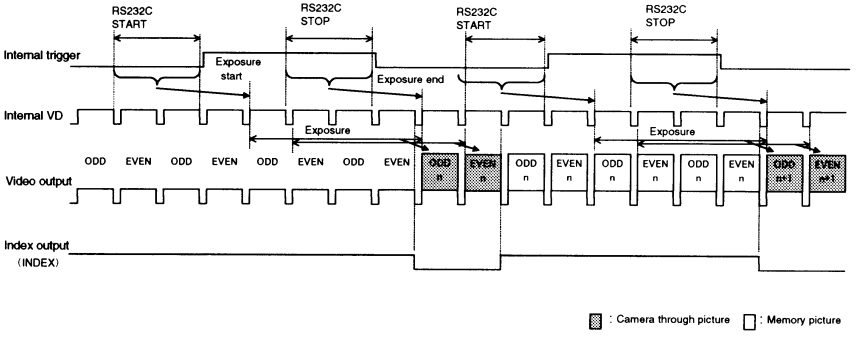
Accumulation of charges is started and ended through RS232C commands to the DIGITAL terminal, the vertical sync signal is reset and field images are output.

* RS232C control is required for this mode. To use it, consult with your dealer.

START-STOP command interval : More than 33.4ms

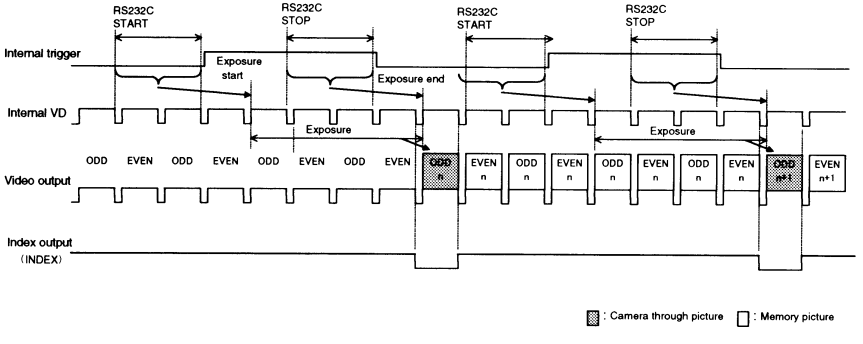
STOP-START command interval : More than 33.4ms

(Frame storage period)



▨ : Camera through picture □ : Memory picture

(Field storage period)



▨ : Camera through picture □ : Memory picture

7. 6 Freeze Operation by Trigger Input

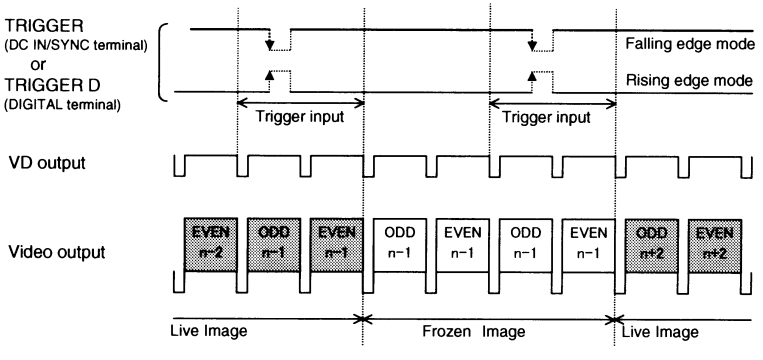
When the shutter mode is set to AUTO, MANUAL or SS and the shutter menu's FREEZE INPUT setting is set to TRIG ⊥ or TRIG ⊤, toggling between the Live and the Frozen Image is performed by the trigger pulse input to the DC IN/SYNC terminal or trigger signal input (LVDS) to the DIGITAL terminal.

Trigger pulse level : (Low Level) : Less than 0.5V , (High Level) : 3.4V to 5V
(DC IN/SYNC terminal)

Trigger pulse fetch timing : Rising edge / Falling edge selectable

Trigger pulse width : More than 2 μs

Trigger pulse interval : More than 33.4ms

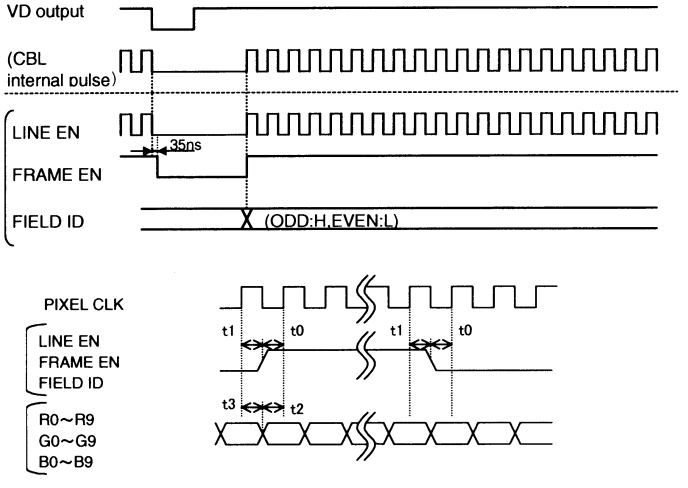


▨ : Camera through picture ☐ : Memory picture

7. 7 Digital output

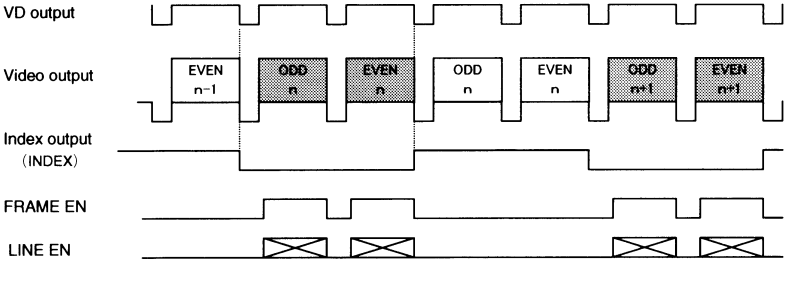
This unit outputs 10 bit digital video signals each for R, G and B from the DIGITAL terminal using the LVDS (Low Voltage Differential Signaling) method.

(1) Sync pulse timing



Item	Symbol	Value	unit
clock frequency		28.63636 (typical)	MHz
enable setup time	t0	10 (minimam)	ns
enable hold time	t1	5 (minimam)	ns
data setup time	t2	10 (minimam)	ns
data hold time	t3	5 (minimam)	ns

The sync pulse is output according to the camera through picture output.
Example: For SS long period exposure, field storage, 2FRM setting



▨ : Camera through picture ☐ : Memory picture

8. BEFORE MAKING SERVICE CALL

Symptom	Items to be checked
No picture	· Is the power supplied correctly? · Is the lens iris adjusted correctly? · Are the cables connected correctly? · Is the shutter mode set correctly?
Poor color	· Is the monitor (TV) adjusted correctly? · Is the white balance of the camera adjusted correctly? (in modes other than automatic trace) · Is the matrix color correction set correctly? · Is the illumination dark? · Is the SC phase adjusted correctly? (External sync)
Noise appears	· Is the camera connector of the camera cable loosened?

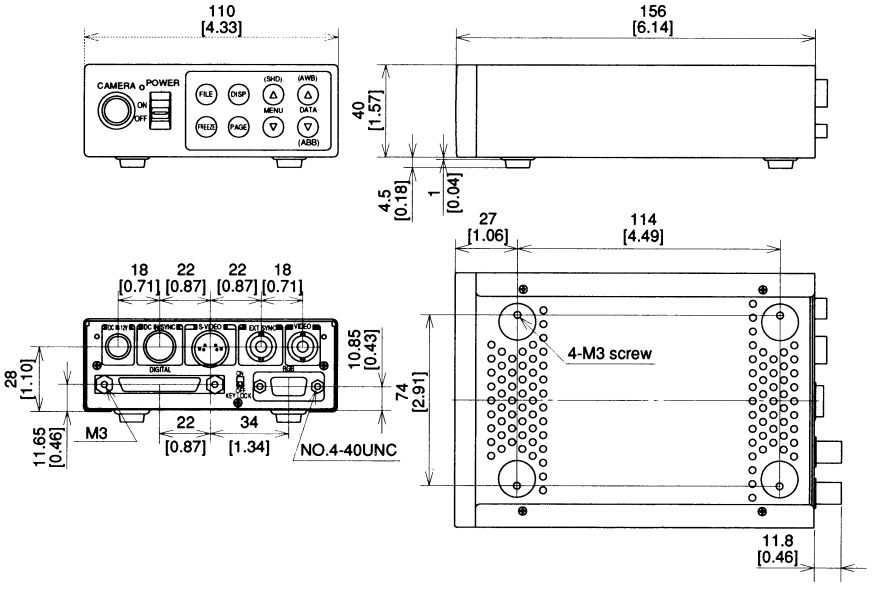
9. SPECIFICATIONS

Power supply	DC12V±10%	
Power consumption	Approx. 7.8W (including a camera head)	
Pick-up system	RGB, 3CCD, Micro prism system	
Available image sensor (Effective pixels)	1/2 inch, 1/3inch IT−CCD (Horizontal: 768pixels, Vertical: 494pixels)	
Scanning system	2:1 interlace	
Scan frequency	Horizontal: 15.734kHz, Vertical: 59.94Hz	
Sync system	Internal/External(Automatic switching)	
Horizontal resolution	JK-TU52H connection: 800TV lines JK-TU53H connection: 750TV lines	
Sensitivity	F11 standard (2000 lx, 3000K)	
Minimum illumination	4 lx (F2.2, Sensitivity+20dB, 3000K)	
SN ratio	64dB standard	
Lens mount	C mount(flange back: 17.526mm in-air)	
Ambient temperature	32 to 104° F (0 to 40℃)	
Ambient humidity	Less than 90%	
Weight	Approx. 1.57 lbs(710g)	
External dimension	4.33"(W) × 1.57"(H) × 6.14(D) (110(W) × 40(H) × 156(D)mm) (except for protruded portion)	
Scene file(user memories)	A, B, C	
White balance	ATW (Automatic tracing balance), AWB (Automatic white balance), MANUAL (Manual)	
Gain	AUTO (Automatic gain control), MANUAL (Manual), OFF (0dB)	
Output signal	VBS: 75Ω unbalanced, BNC connector, NTSC standard Y/C: 75Ω unbalanced, S terminal RGB or $Y/P_R/P_B$: 75Ω unbalanced, D sub 9 pin connector VBS or Y/C: 75Ω unbalanced, D sub 9 pin connector	
External sync input	VBS/BS: 75Ω unbalanced, Sync negative, BNC connector SYNC 0.286V±0.1V, Burst 0.286V±0.1V HD or VD: 2−5V(p−p) Negative	
Sync signal output	SYNC: 2.5V±1V(p−p) 75Ω unbalanced HD, VD, INDEX: $5V^{+0.5}_{-1.0}$ V(p−p), Negative, Load impedance: More than 10kΩ	
External trigger input	TRIGGER: Low level: Less than 0.4V, High level: 3.4−5V 1 Pulse: Positive/Negative selectable 2 Pulse: Positive/Negative/Width selectable	
Interface	Serial data interface (RS-232C)	
	Digital signal interface (LVDS)	TRIG (input) RGB (output): 10bit × 3 PIXEL CLK (output) FIELD ID (output) LINE EN (output) FRAME EN (output)
Ooptional parts	JK-TU52H (1/2 inch 3CCD camera head) JK-TU53H (1/3 inch 3CCD camera head) EXC−T503(Camera cable (3m)), EXC−T506(Camera cable (6.5m)) EXC−T510(Camera cable (10m)), EXC−T530(Camera cable (30m)) EXC−T505RGB(RGB cable), JK−KTU5(Camera head tripod base)	

●Design and specifications are subject to change without notice.

10. EXTERNAL APPEARANCE DIAGRAM

Unit : mm [inch]



(JK-TU52H)

WARNING
This is Class A of EN55022 product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

INFORMATION
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

USER-INSTALLER CAUTION: Your authority to operate this FCC verified equipment could be voided if you make changes or modifications not expressly approved by the party responsible for compliance to Part 15 of the FCC Rules.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

CAUTIONS ON USE

- **Please use this apparatus by connecting only with camera control unit IK-TU51CU.**
- **Read the "CAUTIONS ON USE AND INSTALLATION" in the instruction manual of IK-TU51CU,and follow them.**
- **Please use this apparatus connecting only with camera control unit IK-TU51CU.**
- **Carefully handle the units.**
  Do not drop, or give a strong shock or vibration to the camera. This may cause problems. Treat the camera cables carefully to prevent cable problems, such as cable breakdown and loosened connections.
- **Do not shoot intense light.**
  If there is an intense light at a location on the screen such as a spot light, a blooming and smearing may occur.
  When intense light enters, vertical stripes may appear on the screen. This is not a malfunction. Ghosts may occur when there is an intense light near the object. In this case, change the shooting angle.
- **Install the camera in a location free from noise.**
  If the camera or the cables are located near power utility lines or a TV, etc. undesirable noise may appear on the screen. In such a case, try to change the location of the camera or the cable wiring.

- **Moire**
  When thin stripe patterns are shot, stripe patterns that are not actually there (moire) may appears as interference stripes. This is not a malfunction.

- **Operating ambient temperature and humidity.**
  Do not use the camera in places where temperature and humidity exceed the specifications. Picture quality will lower and internal parts may be damaged.
  Be particularly careful when using in places exposed to direct sunlight. When shooting in hot places, depending on the conditions of the object and the camera (for example when the gain is increased), noise in the form of vertical strips or white dots may occur. This is not a malfunction.

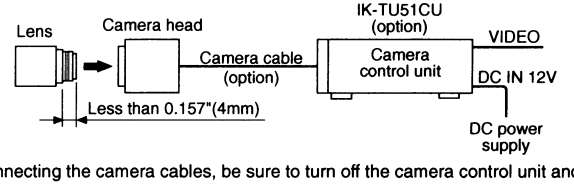
- **Handling of the camera head and protection cap.**
  Keep the camera head and the protection cap away from children. Children may put them into mouth or swallow them accidentally. The protection cap protects the image sensing plane when the lens is removed from the camera head, do not throw away.

- **When cleaning the camera**
  Always turn off the power and make a cleaning with a piece of dry cloth. If necessary, gently wipe with a cloth dampened with thinned detergent. Do not use benzine, alcohol, thinner, etc. If used, coating and printed letters may be discolored. When cleaning the lens, use a lens cleaning paper, etc.

COMPONENTS

(1) Camera head (without lens) 1
(2) Accessories
  (a) Instruction manual 1

CONNECTION



- When connecting the camera cables, be sure to turn off the camera control unit and the other equipment connected.
- We suggest to use a C mount lens for 3CCD camera.
  When using other lens, the best camera performance of this camera may not be obtained.
  (For example, low resolution may occur, focus may be lost through the range of a zoom lens, and flare, ghost or shading may occur)
  Furthermore, in order to avoid damaging the mounting portion of the camera head, use a lens which projection dimension from the mounting base is less than 0.157"(4mm).

SPECIFICATIONS

Image sensor	1/2inch IT-CCD
Effective pixels	Horizontal: 768 pixels, Vertical: 494 pixels
Horizontal resolution	800TV lines
Sensitivity	F11 standard (2000 lx,3000K)
Minimum illumination	4 lx (F2.2、Sensitivity + 20dB,3000K)
SN ratio	64dB standard
Lens mount	C mount(flange back:17.526mm in-air)
Ambient temperature	32 to 104° F (0℃ to 40℃)
Ambient humidity	Less than 90%
Weight	Approx. 2.82 oz (80g)

- Design and specifications are subject to change without notice.

OPTIONAL PARTS

For further details, contact your camera dealer.

Camera control unit

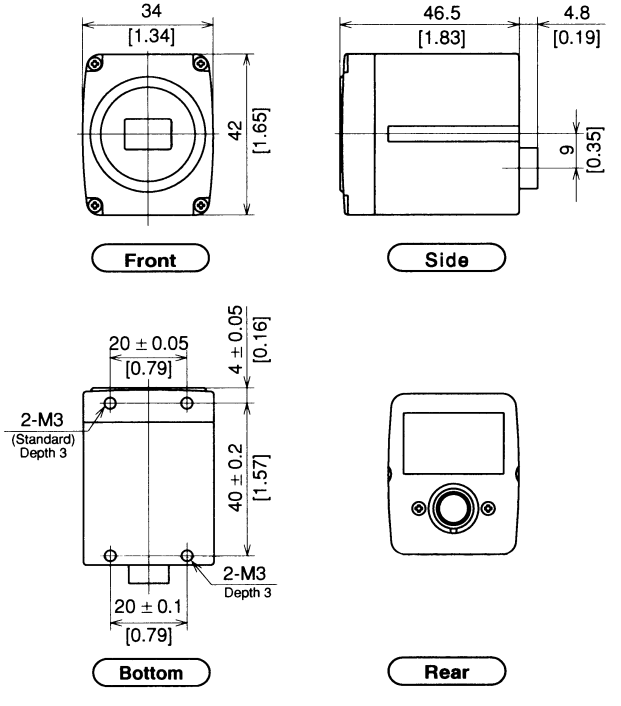
Type name
IK-TU51CU

Camera cable

Type name	Length m
EXC-T503	3
EXC-T506	6.5
EXC-T510	10
EXC-T530	30

EXTERIOR DIMENSIONS

Unit : mm [inch]
ø : diameter



(JK-TU53H)

WARNING
This is Class A of EN55022 product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

INFORMATION
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

USER-INSTALLER CAUTION: Your authority to operate this FCC verified equipment could be voided if you make changes or modifications not expressly approved by the party responsible for compliance to Part 15 of the FCC Rules.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

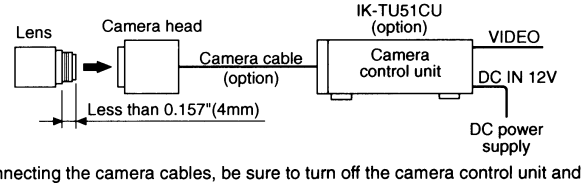
CAUTIONS ON USE

- **Please use this apparatus by connecting only with camera control unit IK-TU51CU.**
- **Read the "CAUTIONS ON USE AND INSTALLATION" in the instruction manual of IK-TU51CU,and follow them.**
- **Please use this apparatus connecting only with camera control unit IK-TU51CU.**
- **Carefully handle the units.**
  Do not drop, or give a strong shock or vibration to the camera. This may cause problems. Treat the camera cables carefully to prevent cable problems, such as cable breakdown and loosened connections.
- **Do not shoot intense light.**
  If there is an intense light at a location on the screen such as a spot light, a blooming and smearing may occur.
  When intense light enters, vertical stripes may appear on the screen. This is not a malfunction. Ghosts may occur when there is an intense light near the object. In this case, change the shooting angle.
- **Install the camera in a location free from noise.**
  If the camera or the cables are located near power utility lines or a TV, etc. undesirable noise may appear on the screen. In such a case, try to change the location of the camera or the cable wiring.
- **Moire**
  When thin stripe patterns are shot, stripe patterns that are not actually there (moire) may appears as interference stripes. This is not a malfunction.
- **Operating ambient temperature and humidity.**
  Do not use the camera in places where temperature and humidity exceed the specifications. Picture quality will lower and internal parts may be damaged.
  Be particularly careful when using in places exposed to direct sunlight. When shooting in hot places, depending on the conditions of the object and the camera (for example when the gain is increased), noise in the form of vertical strips or white dots may occur. This is not a malfunction.
- **Handling of the camera head and protection cap.**
  Keep the camera head and the protection cap away from children. Children may put them into mouth or swallow them accidentally. The protection cap protects the image sensing plane when the lens is removed from the camera head, do not throw away.
- **When cleaning the camera**
  Always turn off the power and make a cleaning with a piece of dry cloth. If necessary, gently wipe with a cloth dampened with thinned detergent. Do not use benzine, alcohol, thinner, etc. If used, coating and printed letters may be discolored. When cleaning the lens, use a lens cleaning paper, etc.

COMPONENTS

(1) Camera head (without lens) 1
(2) Accessories
  (a) Instruction manual 1

CONNECTION



- When connecting the camera cables, be sure to turn off the camera control unit and the other equipment connected.
- We suggest to use a C mount lens for 3CCD camera.
  When using other lens, the best camera performance of this camera may not be obtained.
  (For example, low resolution may occur, focus may be lost through the range of a zoom lens, and flare, ghost or shading may occur)
  Furthermore, in order to avoid damaging the mounting portion of the camera head, use a lens which projection dimension from the mounting base is less than 0.157"(4mm).

SPECIFICATIONS

Image sensor	1/3inch IT-CCD
Effective pixels	Horizontal: 768 pixels, Vertical: 494 pixels
Horizontal resolution	750TV lines
Sensitivity	F11 standard (2000 lx,3000K)
Minimum illumination	4 lx (F2.2、Sensitivity + 20dB,3000K)
SN ratio	64dB standard
Lens mount	C mount(flange back:17.526mm in-air)
Ambient temperature	32 to 104° F (0℃ to 40℃)
Ambient humidity	Less than 90%
Weight	Approx. 1.94 oz (55g)

- Design and specifications are subject to change without notice.

OPTIONAL PARTS

For further details, contact your camera dealer.

Camera control unit

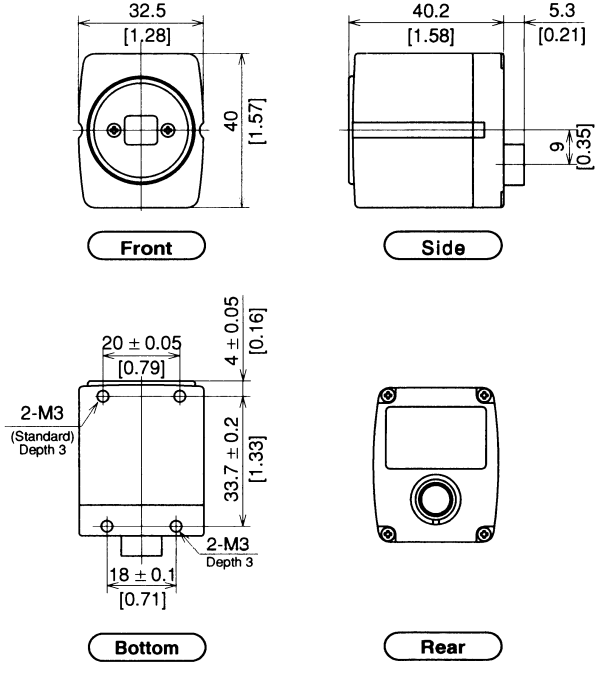
Type name
IK-TU51CU

Camera cable

Type name	Length m
EXC-T503	3
EXC-T506	6.5
EXC-T510	10
EXC-T530	30

EXTERIOR DIMENSIONS

Unit : mm [inch]
ø : diameter



SECTION 2
ELECTRICAL ADJUSTMENT

1. ELECTRICAL ADJUSTMENT PROCEDURES

<Before Adjustment>

As for the preparation of the adjustments, the required equipments, connection diagrams and initial settings are described in the item 1-1.

The total adjustments containing all adjustment procedures are described in the item 1-2 to overhaul the unit.

Adjust from the beginning to the last step by step. Don't omit any procedure, otherwise the adjust-ment will be incorrect.

Partial adjustment procedures are shown in the flowchart in the item 1-3. Adjust according to the flowchart, otherwise the adjustment will be incorrect.

1-1. Preparations

1-1-1. Equipment Required

- AC adaptor
- Waveform monitor (WFM)
- Vector scope
- Frequency counter
- Digital voltmeter
- Color monitor
- Plastic chip screwdriver
- Lights (TOSHIBA photo reflector lamp 500W x 2, or a halogen lamp 500W x 2)
- White paper (paper for copy, etc.)
- Extension jig kit (23007565)
  (used when repairing)

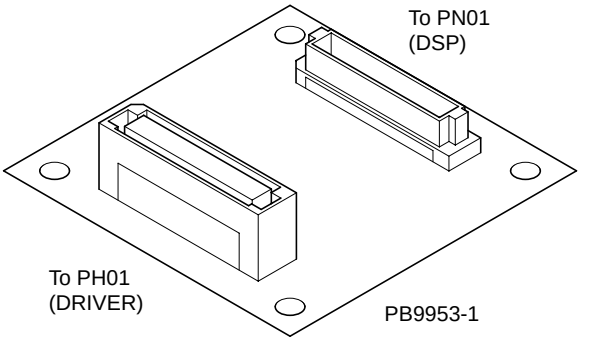


Fig. 1

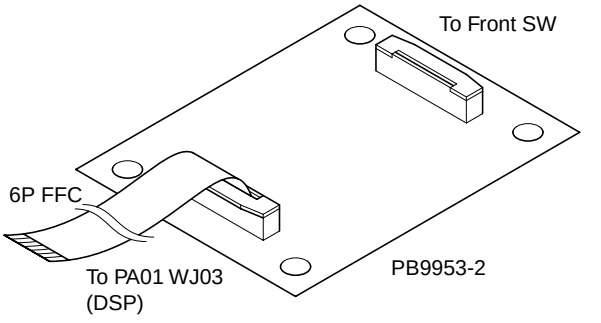


Fig. 2

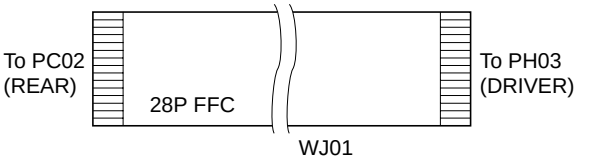


Fig. 3

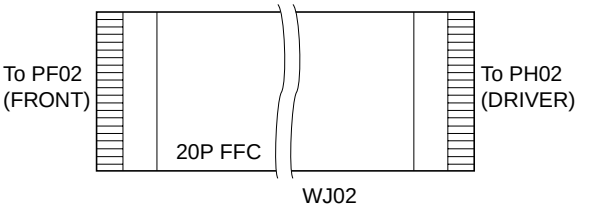


Fig. 4

1-1-2. Preparation before Adjustment

<Opening the CCU>

1. Remove all cables connected to CCU.
2. Remove one scrwe (2) fixing the unit cover (1).

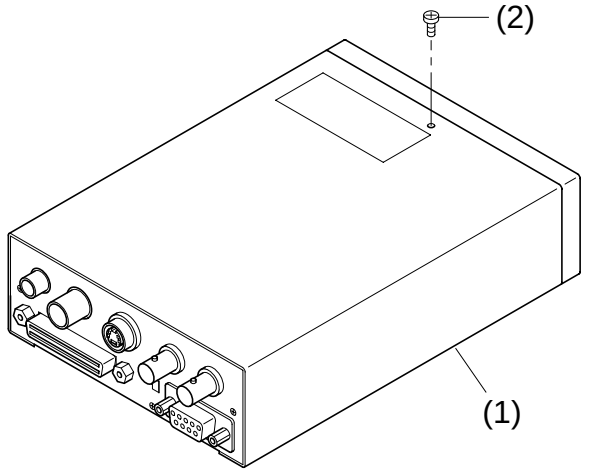


Fig. 5

3. Turn over the unit.
4. Remove four screws (3) fixing the unit cover (1).
5. Pull the mechanical chassis (4) in the arrow direction.

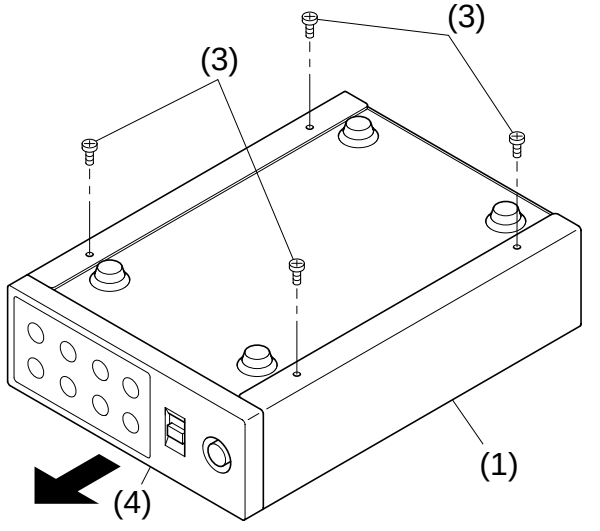


Fig. 6

1-1-3. Equipment Connection Diagram

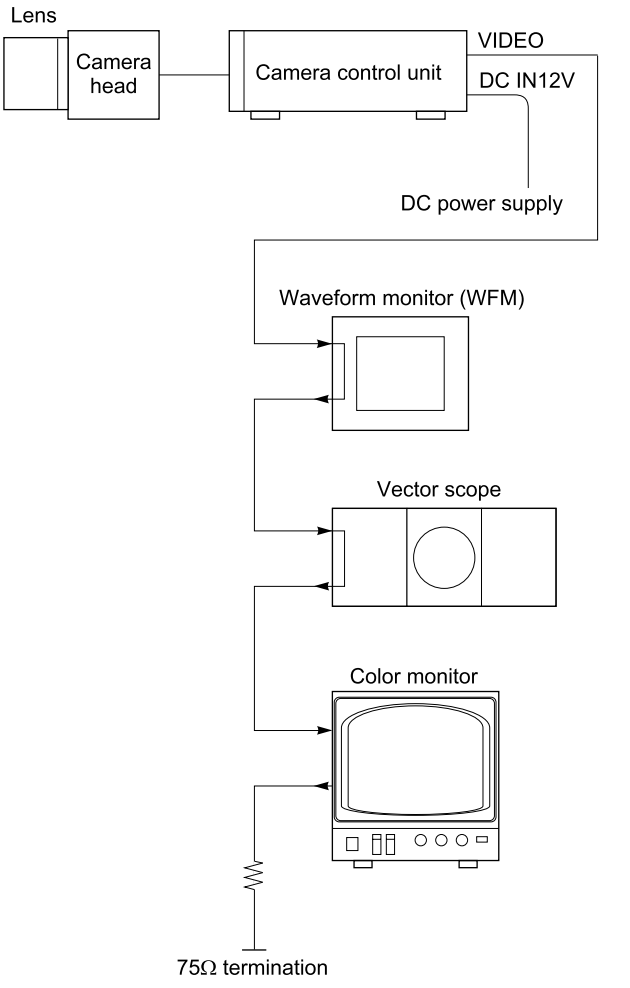


Fig. 7

1-1-4. Initial Setting

1. Perform the warming up for approx. 5 minutes with the POWER switch turned “ON” before performing the adjustments.
2. When the chart is illuminated unevenly, the correct adjustment cannot be performed. So set the light equipments to give an even illumination.

Note: Perform the adjustments in a location with less dust to prevent inside of the camera head from dirty.

1-1-5. Adjusting Locations

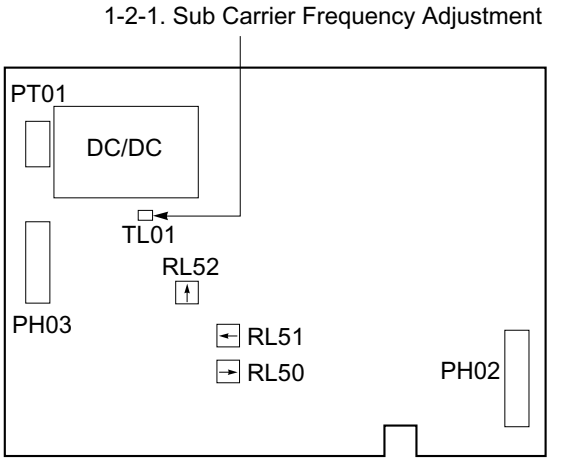


Fig. 8 Driver PC board (Top side)

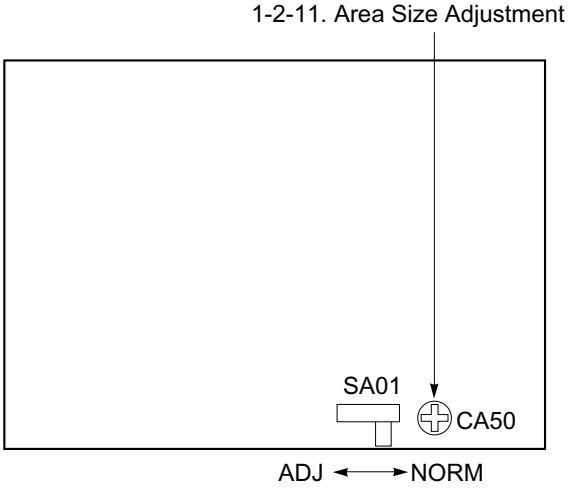


Fig. 9 DSP PC board (Bottom side)

1-2. Total Adjustments

The adjustments are required when the unit is overhauled.

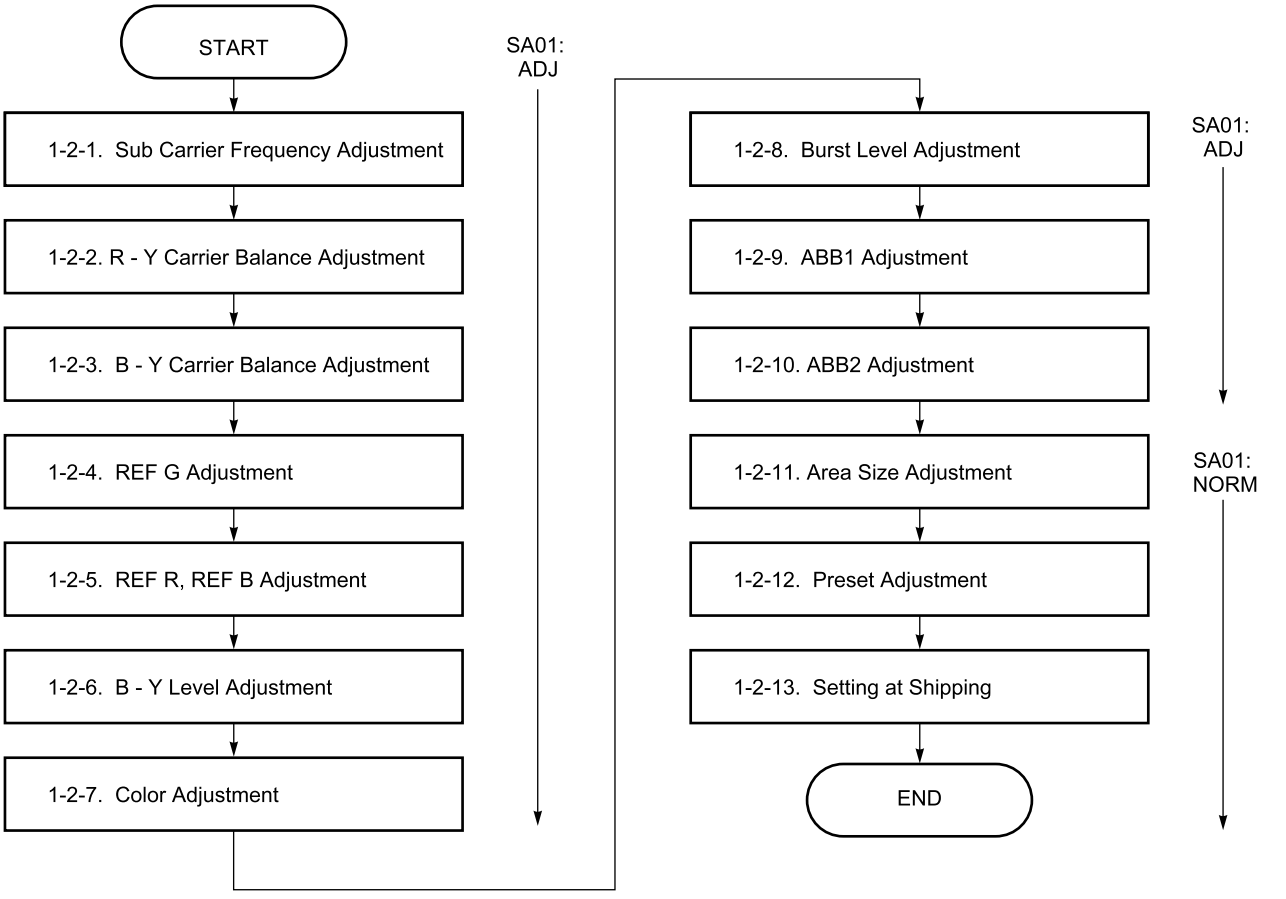
Be sure to perform the adjustments from the beginning to the last. When performing some adjustments separately, perform the adjustments following the flowchart shown in the item 1-3.

When performing the adjustments;

1. Set SA01 on the DSP PC board to ADJ side and enter the unit to the adjusting mode.
2. Push the MENU button (on the front panel) and select the adjusting item.

   Adjust the controls and electrical controls on each PC board. The electrical controls are adjusted by the DATA buttons (on the front panel).

<Flowchart>



1-2-1. Sub Carrier Frequency Adjustment

Screen display: 01 INT SC
Test equipment: Frequency counter
Test point: TL01/Driver PC board
Adjusting point: DATA UP/DOWN
Specification: 3.579545 MHz ± 10 Hz

Note: External sync mode is not set.

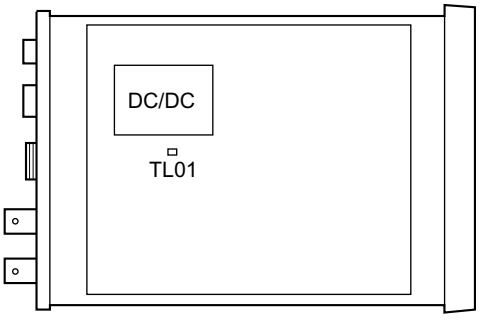


Fig. 10

1-2-2. R - Y Carrier Balance Adjustment

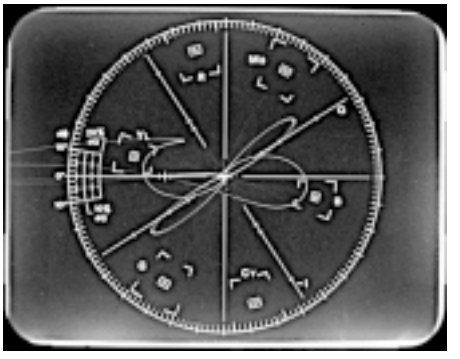
Screen display: 02 R - Y CAR BAL
Test equipment: Vector scope (MAX GAIN)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

1. Set the luminance spot of the vector scope at its center with the DATA buttons.

1-2-3. B - Y Carrier Balance Adjustment

Screen display: 03 B - Y CAR BAL
Test equipment: Vector scope (MAX GAIN)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

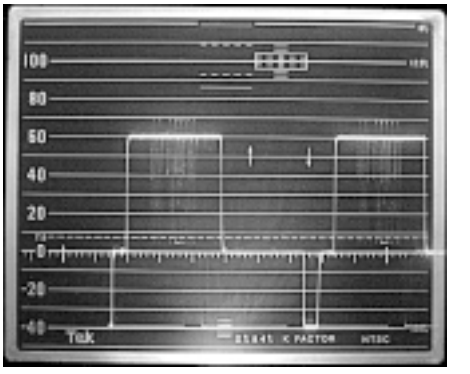
1. Set the luminance spot of the vector scope at its center with the DATA buttons.
2. Repeat the items 1-2-2 and 1-2-3 to set the luminance spot to the center of the vector scope.



1-2-4. REF G Adjustment

Screen display: 04 REF G
Test equipment: WFM (LPF mode)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN
Specification: 60 ± 1 IRE

1. Adjust the white level of the waveform to 60 ± 1 IRE with the DATA buttons.

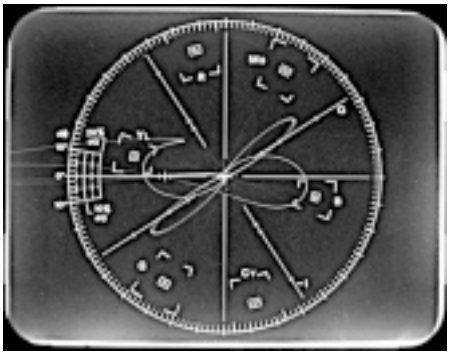


1-2-5. REF R , REF B Adjustment

Screen display: 05 REF R, REF B
Test equipment: Vector scope (MAX GAIN)
Test point: VIDEO OUT
Adjusting point: RL50, RL51/Driver PC board

1. Set the luminance spot of the vector scope at its center by adjusting at RL50, RL51.

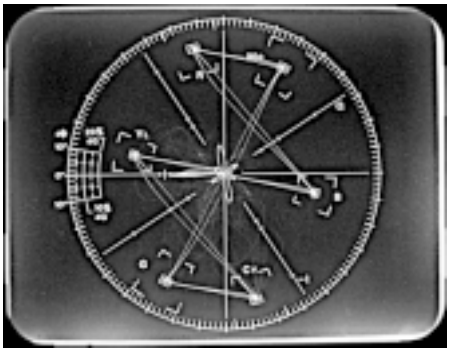
Note: The black and white luminance spots appear. Adjust either of the two which is moved by the RL50, RL51.



1-2-6. B - Y Level Ajustment

Screen display: 06 B - Y LEVEL
Test equipment: Vector scope
Test point: VIDEO OUT
Adjusting point: RL52/Driver PC board

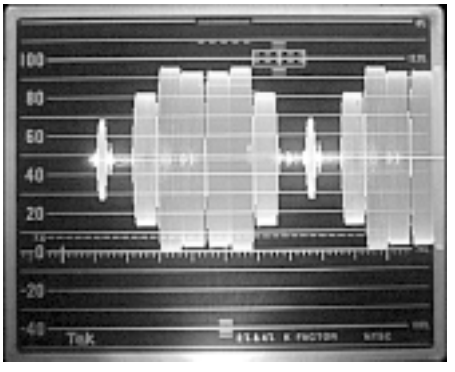
1. Overlap the burst signal on B - Y axis with the PHASE control of the vector scope.
2. Adjust the R luminance spot to set it within the mark with the GAIN control of the vector scope.
3. Adjust the color luminance spot of YL to set it within each mark ⊞ by adjusting at RL52.
4. Confirm each color luminance spot (YL, CY, G, MG, R, B) to set it within each mark ⊞.



1-2-7. Color Adjustment

Screen display: 07 CHR LEVEL
Test equipment: WFM (BPF mode)
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN
Specification: 95 ± 2 IRE

1. Adjust the R amplitude on the waveform monitor to 95 ± 2 IRE with the DATA buttons.



1-2-8. Burst Level Adjustment

Screen display: 08 BURST LEVEL
Test equipment: WFM (BPF mode),
Vector scope
Test point: VIDEO OUT
Adjusting point: DATA UP/DOWN

1. Adjust the burst level to 75% position of the vector scope with the DATA buttons.
   Or, adjust the burst level of the waveform monitor to 40 ± 1 IRE with the DATA buttons.

1-2-9. ABB1 Adjustment

Screen display: 09 ABB1

1. Set the lens iris to close.
2. Push the DATA buttons.
3. The automatic black balance adjustment is performed automatically and “ABB OK” is displayed on the screen.

1-2-10. ABB2 Adjustment

Screen display: 11 ABB2

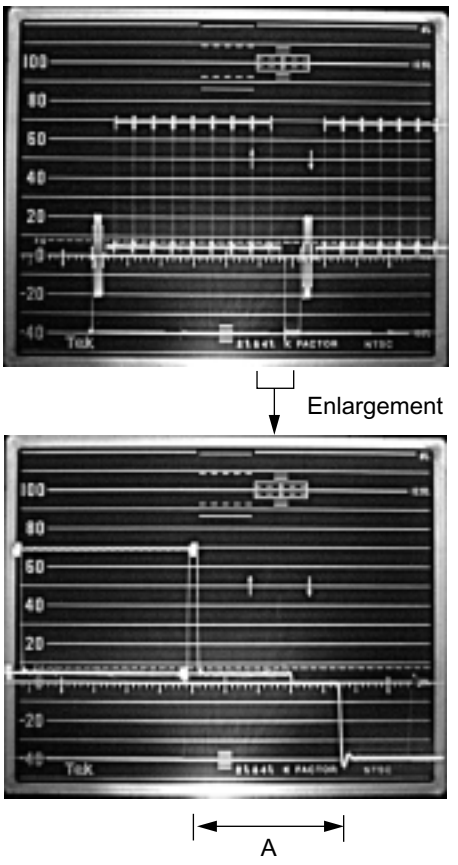
1. Set the lens iris to close.
2. Push the DATA buttons.
3. The automatic black balance adjustment is performed automatically, and “ABB OK” is displayed on the screen.

1-2-11. Area Size Adjustment

Test equipment: WFM (1 μs mode)
Test point: VIDEO OUT
Adjusting point: CA50/DSP PC board
Specification: 4.5 μs ± 400 ns

1. Set SA01 on the DSP PC board to NORM side.
2. Set the lens iris to close.
3. Push the DISP button twice to display the INDEX screen.
4. Push the PAGE button to display the SHUTTER screen.
5. Set the MODE to AUTO with the DATA buttons.
6. Set the “→” cursor to AREA position with the MENU DOWN button and set to PRESET A with the DATA buttons.
7. Set the “→” cursor to AREA DISP position with the MENU DOWN button.
8. Set the screen to the AREA screen by pushing the DATA buttons.
9. Adjust the portion A to obtain 4.5 μs ± 400 ns by adjusting CA50.

10. Push the DISP button twice to erase the screen.



1-2-12. Preset Adjustment

1. Select <FILE A> with the FILE button.
   Disable color bar pattern or menu display by pushing the DISP button if necessary.
2. Push the MENU DOWN button and DATA DOWN button simultaneously for more than 1 second.
3. The preset operation completes and “PRESET OK” appears on the display.
4. Select <FILE B> with the FILE button.
5. Perform the same steps as 2 ~ 4.
6. Select <FILE C> with the FILE button.
7. Perform the same steps as 2 ~ 4.
8. Select <FILE A> with the FILE button.

1-2-13. Setting at Shipping

POWER (FRONT) : OFF
KEY LOCK (REAR) : OFF

1-3. Partial Adjustments

In this chapter, the adjustments required relatively frequently are selected and associated items to be checked previously or to be adjusted before or after the adjustments are given in the flowchart below.

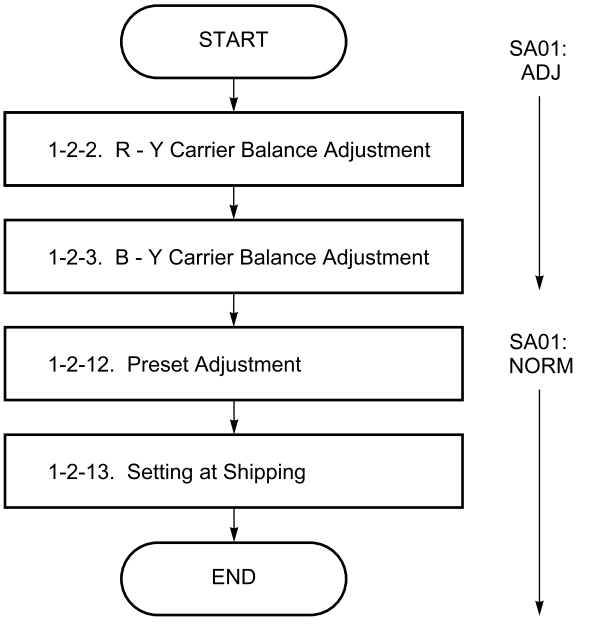
Be sure to perform the adjustments following to the flowchart.

Items shown within the frame:

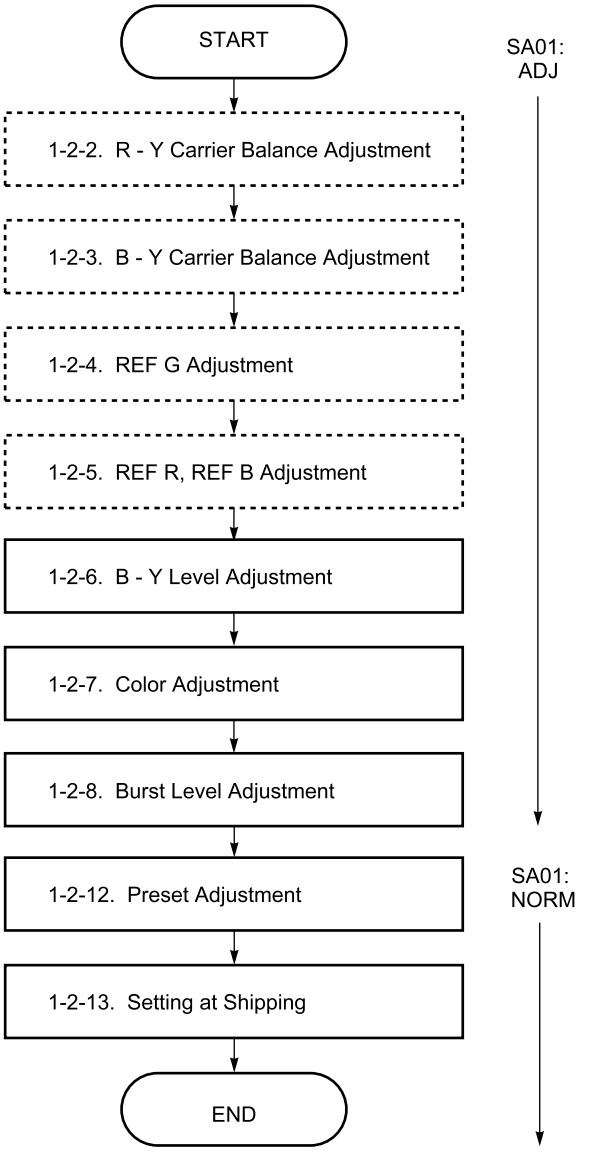
Confirm and adjust if the specification is out of its range.

This adjustment is always required.

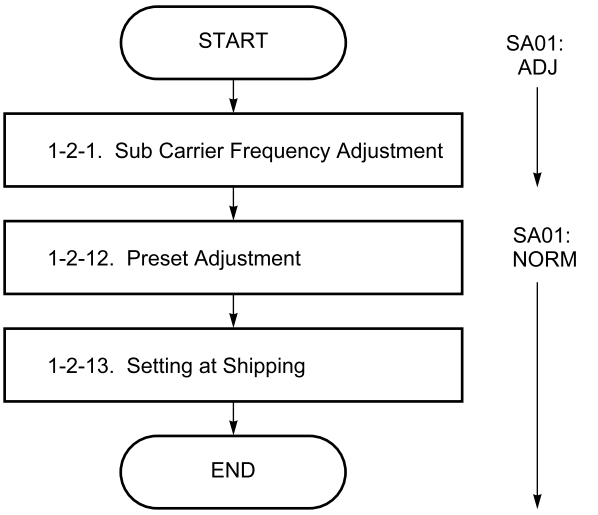
1-3-1. Carrier Balance Adjustment



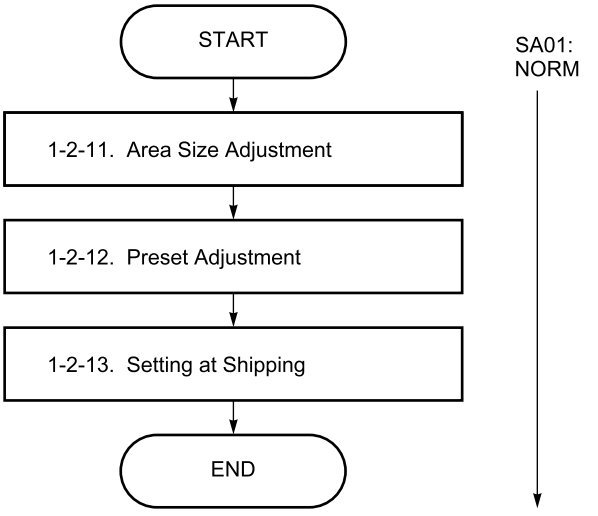
1-3-2. Color Bar Adjustment



1-3-3. Sub Carrier Frequency Adjustment



1-3-4. Area Size Adjustment



SECTION 3
EXPLODED VIEWS AND PARTS LIST

SAFETY PRECAUTION

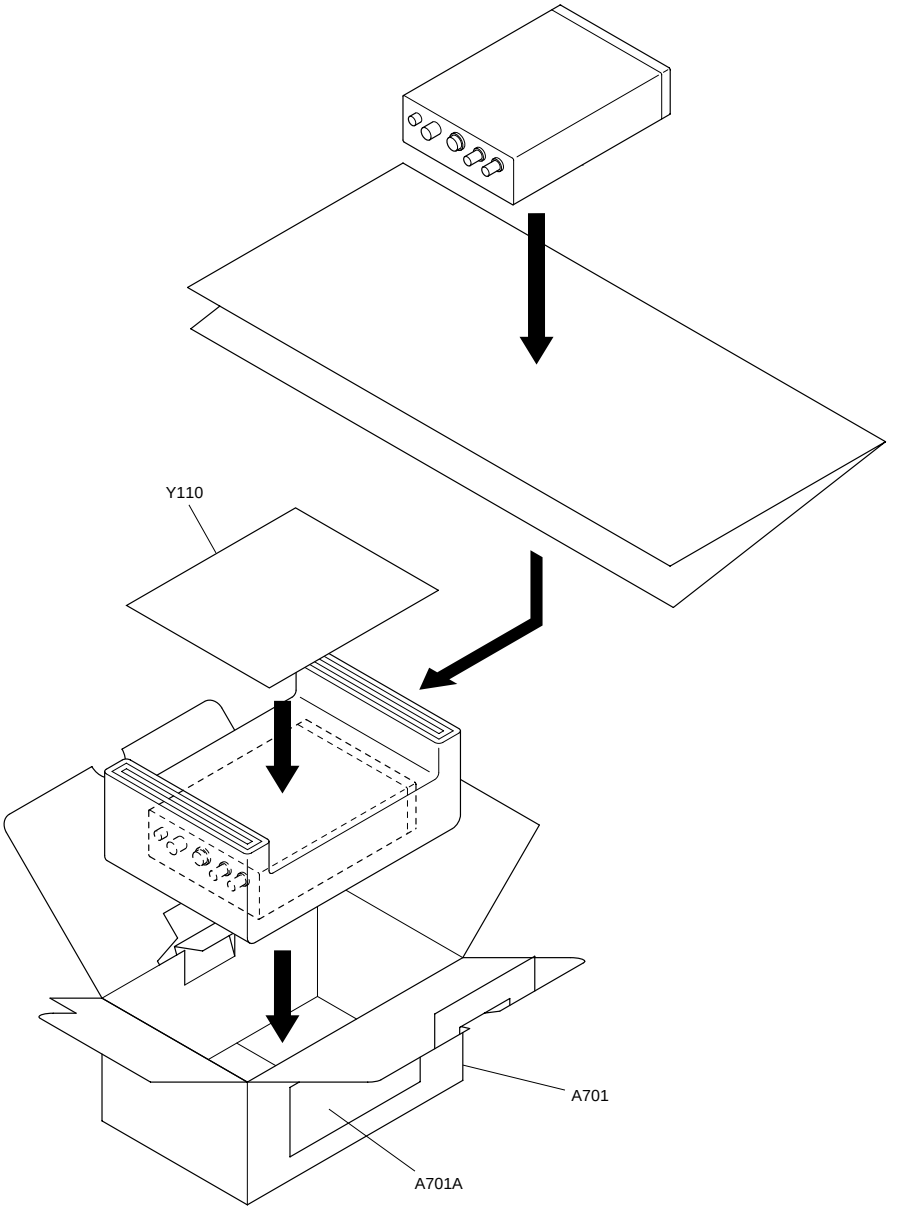
The parts identified by ⚠ mark are critical for safety. Replace only with part number specified.

The mounting position of replacement is to be identical with originals.

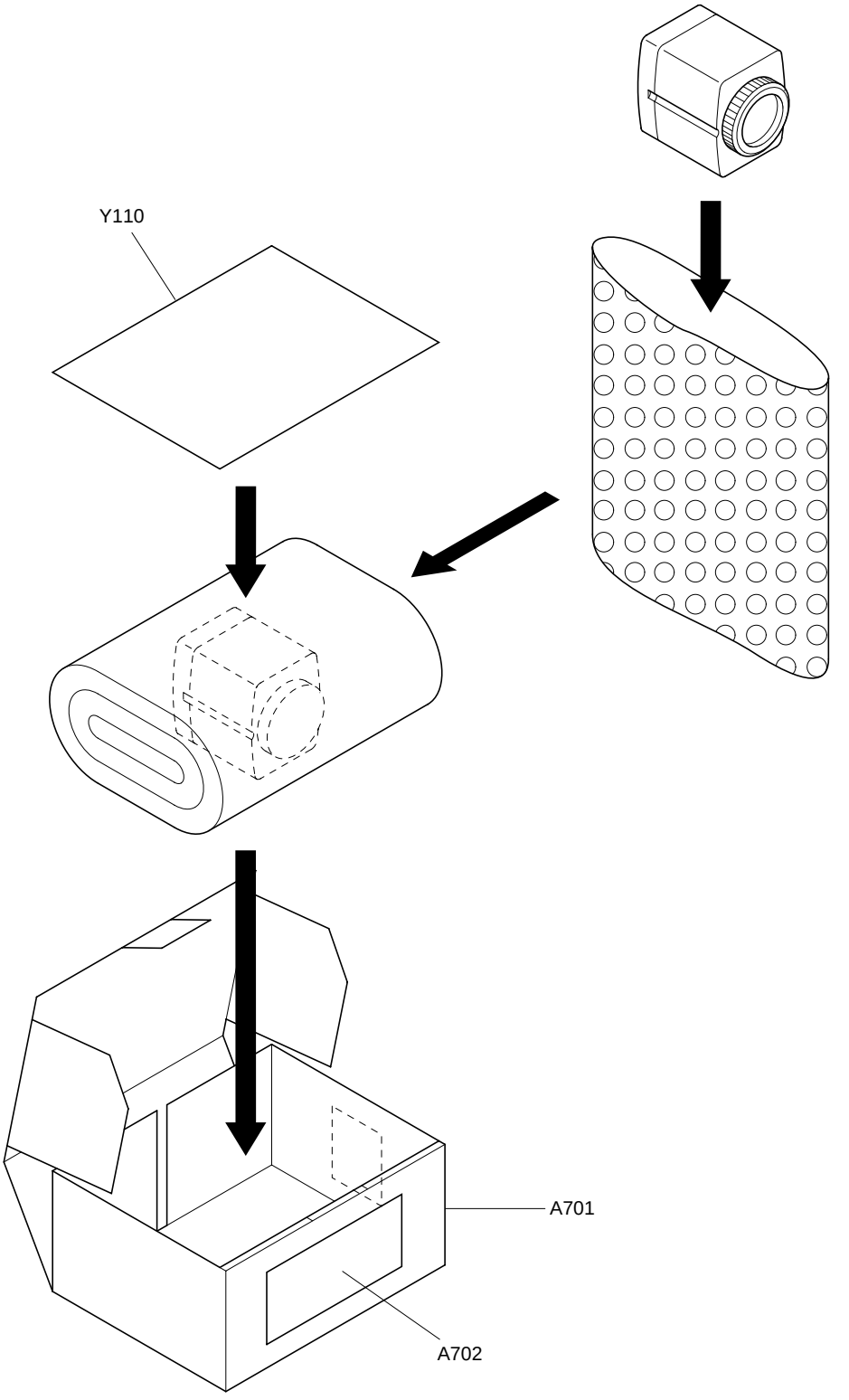
The substitute replacement parts which do not have the same safety characteristics are specified in the parts list may create shock, fire or other hazards.

1. EXPLODED VIEWS

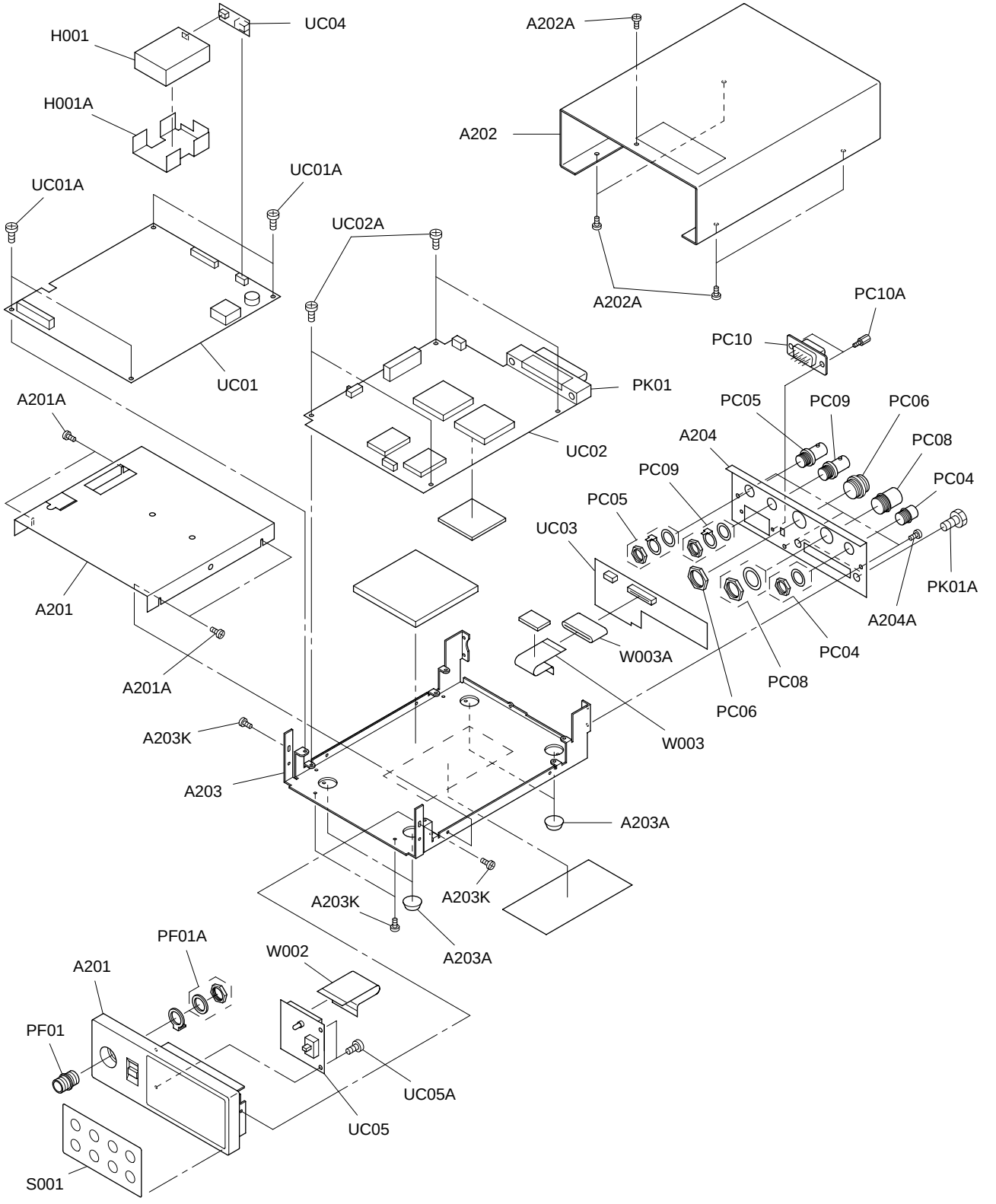
1-1. Packing Assembly (IK-TU51CU)



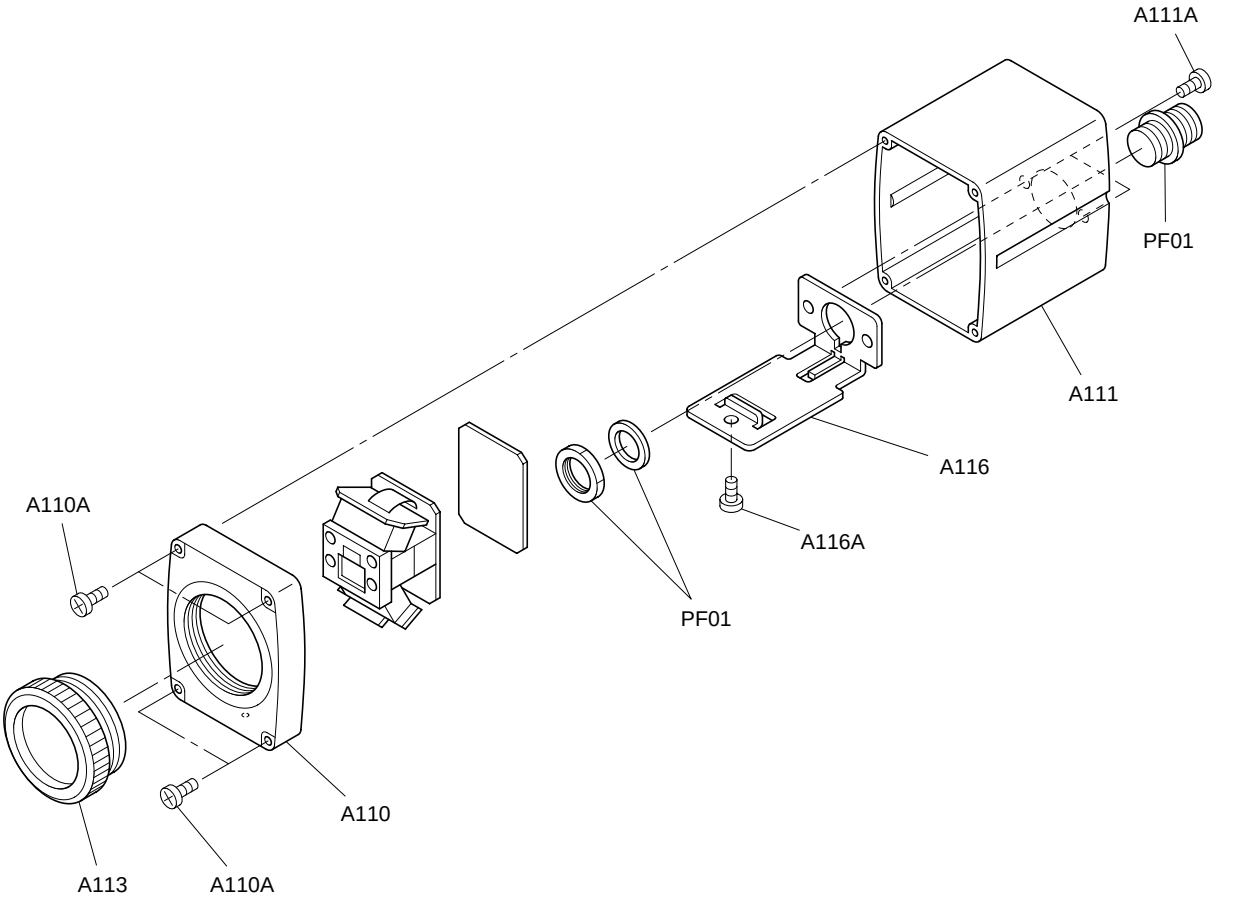
1-2. Packing Assembly (JK-TU52H/JK-TU53H)



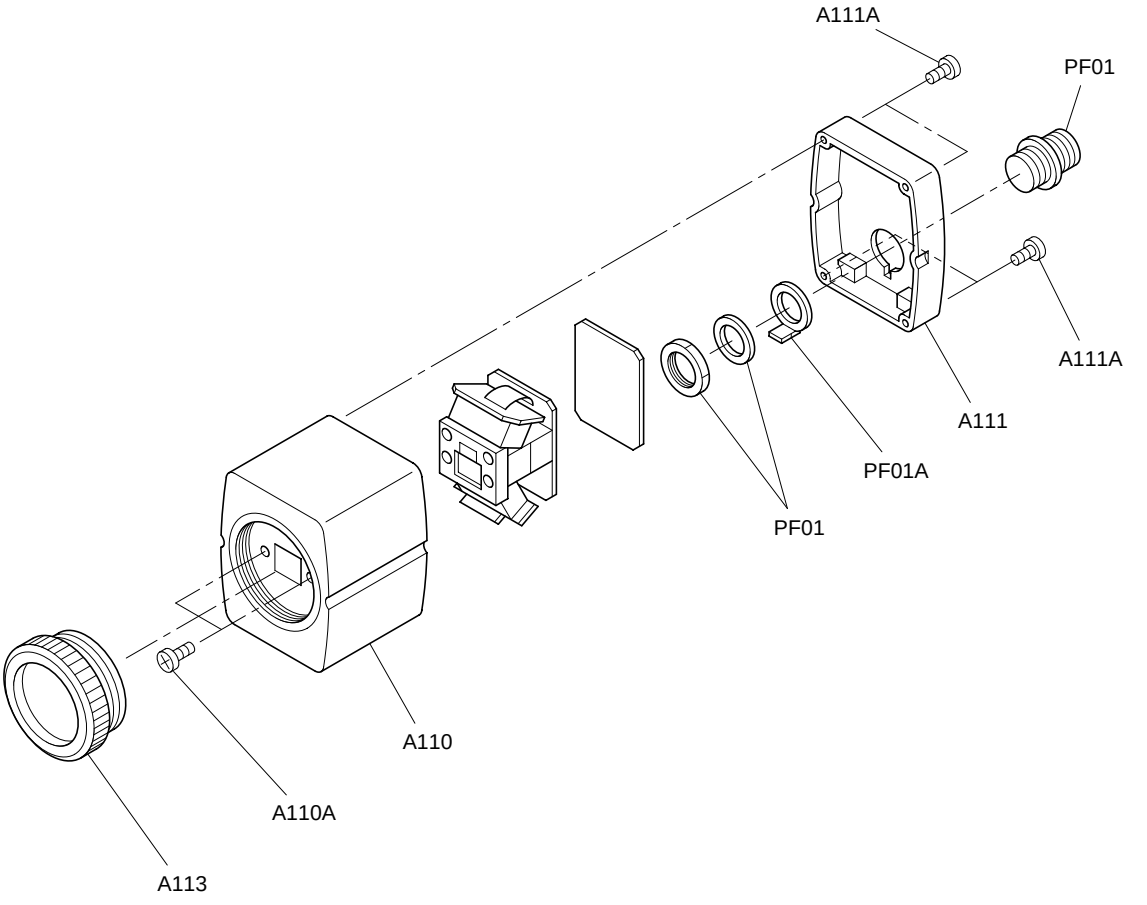
1-3. Chassis Assembly (IK-TU51CU)



1-4. Camera Head Assembly (JK-TU52H)



1-5. Camera Head Assembly (JK-TU53H)



2. PARTS LIST

(IK-TU51CU)

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
		- ELECTRICAL PARTS -	
		- MISCELLANEOUS -	
■ UC01	23785338	PC Board Assy	DRV(PB9606-1)
		- INTEGRATED CIRCUITS -	
QB01	70200809	IC	MAX4181EUT
QD01	B0493259	IC	TC74HC4053AF
QD02	70200699	IC	MAX4187ESD
QD04	B0493259	IC	TC74HC4053AF
QD05	70200870	IC	MB88347PFV
QD06	B0493259	IC	TC74HC4053AF
QG01	70200809	IC	MAX4181EUT
QH06	70200149	IC	CXD1265R
QH16	70129037	IC	UPD16502G
QJ02	23319021	IC	LA7213
QJ07	B0493259	IC	TC74HC4053AF
QJ10	70129160	IC	CXD1217Q
QJ18	70200184	IC	CXD1216M
QL02	70200699	IC	MAX4187ESD
QL04	70200699	IC	MAX4187ESD
QL06	70200699	IC	MAX4187ESD
QL07	70200870	IC	MB88347PFV
QL09	70129930	IC	CXA1592R
QR01	70200809	IC	MAX4181EUT
QS01	B0493259	IC	TC74HC4053AF
QS02	70200870	IC	MB88347PFV
QT06	70200502	IC	PST9128NR
		- TRANSISTORS -	
QB02	23000484	IC	MAX4517CUK
QB03	23000483	IC	MAX4516CUK
QB04	23000480	IC	AD8051ART
QB05	23000479	IC	AD603AR
QB06	23000488	IC	NJM072BV
QB07	23000483	IC	MAX4516CUK
QB08	23000483	IC	MAX4516CUK
QB21	70114329	Transistor,Chip	UPA673T
QB22	70114329	Transistor,Chip	UPA673T
QB23	70114340	Transistor,Chip	UPA674T
QD03	A6030883	IC	TC7W08FU
QD07	23000487	IC	MAX4185EUB
QG02	23000484	IC	MAX4517CUK
QG03	23000483	IC	MAX4516CUK
QG04	23000480	IC	AD8051ART
QG05	23000479	IC	AD603AR
QG06	23000488	IC	NJM072BV
QG07	23000483	IC	MAX4516CUK
QG08	23000483	IC	MAX4516CUK
QG21	70114329	Transistor,Chip	UPA673T
QG22	70114329	Transistor,Chip	UPA673T
QG23	70114340	Transistor,Chip	UPA674T
QH01	23314889	Transistor	UMT2N TL
QH02	70114329	Transistor,Chip	UPA673T
QH03	A6030898	IC	TC4W53FU
QH04	A6030683	IC	TC7SHU04FU
QH05	A6030695	IC	TC7SH32FU
QH07	A6030695	IC	TC7SH32FU
QH08	A6031247	IC	TC7SZ00FU
QH10	23000498	IC	XCS20-3VQ100
QH11	23000610	IC	XC17S20-V08C
QH12	A6030695	IC	TC7SH32FU
QH13	23314562	Transistor	2SC4176
QH14	A6031247	IC	TC7SZ00FU
QH15	A6031247	IC	TC7SZ00FU
QH17	23314558	Transistor	2SA1610
QH18	70114340	Transistor,Chip	UPA674T
QH19	A6549570	Transistor,Chip	2SA1586-Y
QH20	A6365620	Transistor,Chip	2SC4116-Y
QH24	A6030681	IC	TC7SH08FU
QJ01	A6365620	Transistor,Chip	2SC4116-Y
QJ03	23314570	Transistor,Chip	UN5116
QJ05	23314558	Transistor	2SA1610
QJ06	23314558	Transistor	2SA1610
QJ08	23314270	Transistor,Chip	UN5212
QJ09	A6549570	Transistor,Chip	2SA1586-Y
QJ12	23314562	Transistor	2SC4176
QJ13	A6030787	IC	TC7SH86F
QJ14	70114329	Transistor,Chip	UPA673T
QJ15	23314562	Transistor	2SC4176
QJ16	70114329	Transistor,Chip	UPA673T
QJ17	23314562	Transistor	2SC4176
QJ19	23314562	Transistor	2SC4176
QJ20	A6030681	IC	TC7SH08FU
QJ21	A6030119	IC	TC7S66FU
QJ22	23000506	IC	MAX4326EUA
QJ23	A6030683	IC	TC7SHU04FU
QJ24	A6030787	IC	TC7SH86F
QJ25	23000575	IC	74VHC123AMTC
QJ26	23000506	IC	MAX4326EUA
QL05	A6030695	IC	TC7SH32FU
QL08	A6030883	IC	TC7W08FU
QL10	23314558	Transistor	2SA1610
QL11	23314558	Transistor	2SA1610
QR02	23000483	IC	MAX4516CUK
QR03	23000484	IC	MAX4517CUK
QR04	23000480	IC	AD8051ART
QR05	23000479	IC	AD603AR
QR06	23000488	IC	NJM072BV
QR07	23000483	IC	MAX4516CUK
QR08	23000483	IC	MAX4516CUK
QR21	70114329	Transistor,Chip	UPA673T
QR22	70114329	Transistor,Chip	UPA673T
QR23	70114340	Transistor,Chip	UPA674T
QS03	23000504	IC	ADG719BRT
QS04	23000505	IC	MAX525BEAP
QS05	23000488	IC	NJM072BV
QS06	23000484	IC	MAX4517CUK
QS09	A6030898	IC	TC4W53FU
QS22	A6549570	Transistor,Chip	2SA1586-Y
QT01	23000486	IC	MAX8860EUA33
QT02	23000486	IC	MAX8860EUA33
QT03	23205017	TRANSISTOR	FDS6875(EL)
QT04	23000485	IC	MAX1626ESA
QT05	23000486	IC	MAX8860EUA33
QT20	A6358620	Transistor,Chip	2SC3265-Y
QT21	A6549570	Transistor,Chip	2SA1586-Y
QT22	23314889	Transistor	UMT2N TL
QT23	A6365620	Transistor,Chip	2SC4116-Y
		- DIODES -	
DH01	23118255	Diode	1T363
DH02	23118255	Diode	1T363
DH03	23118041	Diode,Chip	MA111
DT04	23357034	Diode	RB051L-40TE5
DT05	70115496	Diode	RD6.2Z

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
		- COILS -		
LH01	23246312	Coil,Chip	22µH	
LH02	23246312	Coil,Chip	22µH	
LH50	23232057	Variable,Coil	CP-4L2	
LJ01	23246312	Coil,Chip	22µH	
LJ02	23245844	Coil,Chip	150µH	
LL01	23245846	Coil,Chip	220µH	
LL02	23245846	Coil,Chip	220µH	
LL03	23246229	Coil,Chip	100µH	
LT01	23248250	Coil	47µH	
LT02	23248250	Coil	47µH	
LT03	23248250	Coil	47µH	
		- CAPACITORS -		
CB01	24105121	Cap,Chip	120pF	J 50V
CB02	24105101	Cap,Chip	100pF	J 50V
CB03	24092730	Cap,Chip	0.1µF	K 16V
CB04	24092730	Cap,Chip	0.1µF	K 16V
CB05	24092573	Cap,Chip	0.47µF	K 16V
CB07	24092730	Cap,Chip	0.1µF	K 16V
CB08	24109473	Cap,Chip	0.047µF	K 25V
CB09	24092621	Cap,Chip	1µF	K 10V
CB11	24092730	Cap,Chip	0.1µF	K 16V
CB12	24092730	Cap,Chip	0.1µF	K 16V
CB13	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CB14	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CB16	24092609	Cap,Chip	4.7µF	K 10V
CD01	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CD02	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CD03	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CD04	24092730	Cap,Chip	0.1µF	K 16V
CG01	24105121	Cap,Chip	120pF	J 50V
CG02	24105101	Cap,Chip	100pF	J 50V
CG03	24092730	Cap,Chip	0.1µF	K 16V
CG04	24092730	Cap,Chip	0.1µF	K 16V
CG05	24092573	Cap,Chip	0.47µF	K 16V
CG07	24092730	Cap,Chip	0.1µF	K 16V
CG08	24109473	Cap,Chip	0.047µF	K 25V
CG09	24092621	Cap,Chip	1µF	K 10V
CG11	24092730	Cap,Chip	0.1µF	K 16V
CG12	24092730	Cap,Chip	0.1µF	K 16V
CG13	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CG14	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CG16	24092609	Cap,Chip	4.7µF	K 10V
CH01	24088080	Cap,Chip,Tantalum	33µF	M 10V
CH02	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CH03	24109103	Cap,Chip	0.01µF	K 25V
CH04	24105680	Cap,Chip	68pF	J 50V
CH05	24105680	Cap,Chip	68pF	J 50V
CH06	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CH07	24105220	Cap,Chip	22µF	J 50V
CH08	24109103	Cap,Chip	0.01µF	K 25V
CH09	24092730	Cap,Chip	0.1µF	K 16V
CH10	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CH11	24092730	Cap,Chip	0.1µF	K 16V
CH12	24092730	Cap,Chip	0.1µF	K 16V
CH13	24105330	Cap,Chip	33pF	J 50V
CH16	24088088	Cap,Chip,Tantalum	47µF	M 20V
CH17	24109103	Cap,Chip	0.01µF	K 25V
CH18	24105102	Cap,Chip	1000pF	J 25V
CH20	24088088	Cap,Chip,Tantalum	47µF	M 20V
CH21	24088080	Cap,Chip,Tantalum	33µ F	M 10V
CH22	24092730	Cap,Chip	0.1µF	K 16V
CH23	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CH25	24088088	Cap,Chip,Tantalum	47µF	M 20V
CJ01	24088079	Cap,Chip,Tantalum	10µF	M 10V
CJ02	24088979	Chip,Cap,Tantalum	1µF	M 25V
CJ03	24109681	Cap,Chip	680pF	K 50V
CJ04	24092573	Cap,Chip	0.47µF	K 16V
CJ05	24088079	Cap,Chip,Tantalum	10µF	M 10V
CJ06	24088079	Cap,Chip,Tantalum	10µF	M 10V
CJ07	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CJ08	24092730	Cap,Chip	0.1µF	K 16V
CJ09	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CJ11	24105180	Cap,Chip	18pF	J 50V
CJ12	24092730	Cap,Chip	0.1µF	K 16V
CJ13	24092730	Cap,Chip	0.1µF	K 16V
CJ14	24092730	Cap,Chip	0.1µF	K 16V
CJ15	24092730	Cap,Chip	0.1µF	K 16V
CJ16	24109103	Cap,Chip	0.01µF	K 25V
CJ17	24088979	Chip,Cap,Tantalum	1µF	M 25V
CJ18	24109103	Cap,Chip	0.01µF	K 25V
CJ19	24092730	Cap,Chip	0.1µF	K 16V
CJ21	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CJ22	24105102	Cap,Chip	1000pF	J 25V
CJ23	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CJ24	24092730	Cap,Chip	0.1µF	K 16V
CJ25	24105180	Cap,Chip	18pF	J 50V
CJ26	24092730	Cap,Chip	0.1µF	K 16V
CJ27	24092730	Cap,Chip	0.1µF	K 16V
CJ28	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CJ29	24105180	Cap,Chip	18pF	J 50V
CJ30	24092730	Cap,Chip	0.1µF	K 16V
CJ31	24092730	Cap,Chip	0.1µF	K 16V
CJ32	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CJ33	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CJ36	24105102	Cap,Chip	1000pF	J 25V
CL01	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CL02	24092730	Cap,Chip	0.1µF	K 16V
CL03	24092730	Cap,Chip	0.1µF	K 16V
CL04	24105330	Cap,Chip	33pF	J 50V
CL05	24105150	Cap,Chip	15pF	J 50V
CL06	24105150	Cap,Chip	15pF	J 50V
CL07	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CL08	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CL09	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CL10	24105470	Cap,Chip	47pF	J 50V
CL11	24105101	Cap,Chip	100pF	J 50V
CL12	24105101	Cap,Chip	100pF	J 50V
CL13	24105390	Cap,Chip	39pF	J 50V
CL14	24105390	Cap,Chip	39pF	J 50V
CL15	24105390	Cap,Chip	39pF	J 50V
CL16	24105390	Cap,Chip	39pF	J 50V
CL17	24092730	Cap,Chip	0.1µF	K 16V
CL18	24092730	Cap,Chip	0.1µF	K 16V
CL19	24092730	Cap,Chip	0.1µF	K 16V
CL20	24092730	Cap,Chip	0.1µF	K 16V
CL21	24092730	Cap,Chip	0.1µF	K 16V
CL22	24092730	Cap,Chip	0.1µF	K 16V
CL23	24088949	Chip,Cap,Tantalum	2.2µF	M 16V
CL24	24092730	Cap,Chip	0.1µF	K 16V
CL25	24088949	Chip,Cap,Tantalum	2.2µF	M 16V
CL26	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CL27	24109103	Cap,Chip	0.01µF	K 25V
CL29	24092730	Cap,Chip	0.1µF	K 16V
CL30	24092730	Cap,Chip	0.1µF	K 16V
CL31	24109103	Cap,Chip	0.01µF	K 25V
CL32	24092730	Cap,Chip	0.1µF	K 16V
CL33	24105430	Cap,Chip	43pF	J 50V
CL34	24105430	Cap,Chip	43pF	J 50V
CL35	24105430	Cap,Chip	43pF	J 50V
CL37	24105330	Cap,Chip	33pF	J 50V
CR01	24105121	Cap,Chip	120pF	J 50V
CR02	24105101	Cap,Chip	100pF	J 50V
CR03	24092730	Cap,Chip	0.1µF	K 16V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CR04	24092730	Cap,Chip	0.1µF	K 16V
CR05	24092573	Cap,Chip	0.47µF	K 16V
CR07	24092730	Cap,Chip	0.1µF	K 16V
CR08	24109473	Cap,Chip	0.047µF	K 25V
CR09	24092621	Cap,Chip	1µF	K 10V
CR11	24092730	Cap,Chip	0.1µF	K 16V
CR12	24092730	Cap,Chip	0.1µF	K 16V
CR13	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CR14	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CR16	24092609	Cap,Chip	4.7µF	K 10V
CS01	24088099	Cap,Chip,Tantalum	10µF	M 6.3V
CS02	24092621	Cap,Chip	1µF	K 10V
CS03	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CS04	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CS05	24092628	Cap,Chip,	10µF	K 6.3V
CS06	24092730	Cap,Chip	0.1µF	K 16V
CS07	24092611	Cap,Chip	2.2µF	K 6.3V
CS08	24092611	Cap,Chip	2.2µF	K 6.3V
CS11	24092611	Cap,Chip	2.2µF	K 6.3V
CS12	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CS13	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CT01	24088980	Cap,Chip,Tantalum	2.2µF	M 25V
CT02	24092628	Cap,Chip,	10µF	K 6.3V
CT03	24088079	Cap,Chip,Tantalum	10µF	M 10V
CT04	24109333	Cap,Chip,	0.033µF	K 25V
CT05	24092628	Cap,Chip,	10µF	K 6.3V
CT06	24109333	Cap,Chip,	0.033µF	K 25V
CT07	24092628	Cap,Chip,	10µF	K 6.3V
CT08	24088978	Cap,Chip,Tantalum	22µF	M 20V
CT09	24088980	Cap,Chip,Tantalum	2.2µF	M 25V
CT10	24295106	Cap,Chip,Tantalum	10µF	M 25V
CT11	24092573	Cap,Chip	0.47µF	K 16V
CT12	24092730	Cap,Chip	0.1µF	K 16V
CT13	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CT14	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CT15	24109333	Cap,Chip	0.033µF	K 25V
CT16	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CT17	24088088	Cap,Chip,Tantalum	47µF	M 20V
CT18	24092730	Cap,Chip	0.1µF	K 16V
CT19	24474103	Cap,Ceramic	0.01µF	N 16V
		- RESISTORS -		
RB01	24998821	Res,Chip	820Ω	D 1/16W
RB02	24998334	Res,Chip	330kΩ	D 1/16W
RB03	24998392	Res,Chip	3.9kΩ	D 1/16W
RB04	24998202	Res,Chip	2kΩ	D 1/16W
RB05	24998911	Res,Chip	910Ω	D 1/16W
RB06	24998112	Res,Chip	1.1kΩ	D 1/16W
RB07	24998472	Res,Chip	4.7kΩ	D 1/16W
RB08	24998102	Res,Chip	1kΩ	D 1/16W
RB09	24998152	Res,Chip	1.5kΩ	D 1/16W
RB10	24998560	Res,Chip	56Ω	D 1/16W
RB11	24998122	Res,Chip	1.2kΩ	D 1/16W
RB12	24998302	Res,Chip	3kΩ	D 1/16W
RB14	24998201	Res,Chip	200Ω	D 1/16W
RB15	24998303	Res,Chip	30kΩ	D 1/16W
RB16	24998101	Res,Chip	100Ω	D 1/16W
RB17	24998332	Res,Chip	3.3kΩ	D 1/16W
RB18	24998101	Res,Chip	100Ω	D 1/16W
RB19	24998101	Res,Chip	100Ω	D 1/16W
RB20	24998332	Res,Chip	3.3kΩ	D 1/16W
RB21	24998101	Res,Chip	100Ω	D 1/16W
RB22	24998622	Res,Chip	6.2kΩ	D 1/16W
RB23	24998362	Res,Chip	3.6kΩ	D 1/16W
RB24	24998152	Res,Chip	1.5kΩ	D 1/16W
RB25	24998432	Res,Chip	4.3kΩ	D 1/16W
RB26	24998750	Res,Chip	75kΩ	D 1/16W
RB27	24998202	Res,Chip	2kΩ	D 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RB28	24998101	Res,Chip	100Ω	D 1/16W
RB29	24998560	Res,Chip	56Ω	D 1/16W
RB30	24998471	Res,Chip	470Ω	D 1/16W
RB32	24998270	Res,Chip	27Ω	D 1/16W
RD01	24998102	Res,Chip	1kΩ	D 1/16W
RD02	24998271	Res,Chip	270Ω	D 1/16W
RD03	24998752	Res,Chip	7.5kΩ	D 1/16W
RD04	24998102	Res,Chip	1kΩ	D 1/16W
RD05	24998102	Res,Chip	1kΩ	D 1/16W
RD06	24998102	Res,Chip	1kΩ	D 1/16W
RD07	24998102	Res,Chip	1kΩ	D 1/16W
RD08	24998750	Res,Chip	75kΩ	D 1/16W
RD09	24998750	Res,Chip	75kΩ	D 1/16W
RD10	24998750	Res,Chip	75kΩ	D 1/16W
RD11	24998102	Res,Chip	1kΩ	D 1/16W
RD12	24998102	Res,Chip	1kΩ	D 1/16W
RD13	24998750	Res,Chip	75kΩ	D 1/16W
RD14	24998750	Res,Chip	75kΩ	D 1/16W
RD15	24998750	Res,Chip	75kΩ	D 1/16W
RD16	24998750	Res,Chip	75kΩ	D 1/16W
RD17	24998750	Res,Chip	75kΩ	D 1/16W
RG01	24998821	Res,Chip	820Ω	D 1/16W
RG02	24998334	Res,Chip	330kΩ	D 1/16W
RG03	24998392	Res,Chip	3.9kΩ	D 1/16W
RG04	24998202	Res,Chip	2kΩ	D 1/16W
RG05	24998821	Res,Chip	820Ω	D 1/16W
RG06	24998112	Res,Chip	1.1kΩ	D 1/16W
RG07	24998472	Res,Chip	4.7kΩ	D 1/16W
RG08	24998102	Res,Chip	1kΩ	D 1/16W
RG09	24998152	Res,Chip	1.5kΩ	D 1/16W
RG10	24998560	Res,Chip	56Ω	D 1/16W
RG11	24998122	Res,Chip	1.2kΩ	D 1/16W
RG12	24998302	Res,Chip	3kΩ	D 1/16W
RG13	24998273	Res,Chip	27kΩ	D 1/16W
RG14	24998201	Res,Chip	200Ω	D 1/16W
RG15	24998303	Res,Chip	30kΩ	D 1/16W
RG16	24998101	Res,Chip	100Ω	D 1/16W
RG17	24998332	Res,Chip	3.3kΩ	D 1/16W
RG18	24998101	Res,Chip	100Ω	D 1/16W
RG19	24998101	Res,Chip	100Ω	D 1/16W
RG20	24998332	Res,Chip	3.3kΩ	D 1/16W
RG21	24998101	Res,Chip	100Ω	D 1/16W
RG22	24998622	Res,Chip	6.2kΩ	D 1/16W
RG23	24998362	Res,Chip	3.6kΩ	D 1/16W
RG24	24998152	Res,Chip	1.5kΩ	D 1/16W
RG25	24998432	Res,Chip	4.3kΩ	D 1/16W
RG26	24998750	Res,Chip	75kΩ	D 1/16W
RG27	24998202	Res,Chip	2kΩ	D 1/16W
RG28	24998101	Res,Chip	100Ω	D 1/16W
RG29	24998560	Res,Chip	56Ω	D 1/16W
RG30	24998471	Res,Chip	470Ω	D 1/16W
RG32	24998270	Res,Chip	27Ω	D 1/16W
RH01	24998103	Res,Chip	10kΩ	D 1/16W
RH02	24998103	Res,Chip	10kΩ	D 1/16W
RH03	24998103	Res,Chip	10kΩ	D 1/16W
RH04	24998203	Res,Chip	20kΩ	D 1/16W
RH05	24998222	Res,Chip	2.2kΩ	D 1/16W
RH06	24998103	Res,Chip	10kΩ	D 1/16W
RH07	24998103	Res,Chip	10kΩ	D 1/16W
RH08	24998101	Res,Chip	100Ω	D 1/16W
RH09	24998101	Res,Chip	100Ω	D 1/16W
RH10	24011105	Res,Chip	1MΩ	J 1/20W
RH11	24998104	Res,Chip	100kΩ	D 1/16W
RH12	24998104	Res,Chip	100kΩ	D 1/16W
RH13	24998393	Res,Chip	390kΩ	D 1/16W
RH14	24998393	Res,Chip	390kΩ	D 1/16W
RH15	24998621	Res,Chip	620Ω	D 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RH16	24011105	Res,Chip	1MΩ	J 1/20W
RH18	24000445	Res,Chip Jumper	0Ω	
RH20	24998151	Res,Chip	150Ω	D 1/16W
RH21	24998472	Res,Chip	4.7kΩ	D 1/16W
RH22	24000445	Res,Chip Jumper	0Ω	
RH23	24998472	Res,Chip	4.7kΩ	D 1/16W
RH24	24998222	Res,Chip	2.2kΩ	D 1/16W
RH25	24998272	Res,Chip	2.7kΩ	D 1/16W
RH26	24998332	Res,Chip	3.3kΩ	D 1/16W
RH27	24998431	Res,Chip	430Ω	D 1/16W
RH28	24998270	Res,Chip	27Ω	D 1/16W
RH30	24998510	Res,Chip	51Ω	D 1/16W
RH31	24998222	Res,Chip	2.2kΩ	D 1/16W
RH32	24998222	Res,Chip	2.2kΩ	D 1/16W
RH33	24998103	Res,Chip	10kΩ	D 1/16W
RH34	24998222	Res,Chip	2.2kΩ	D 1/16W
RH35	24998103	Res,Chip	10kΩ	D 1/16W
RH36	24998101	Res,Chip	100Ω	D 1/16W
RH37	24998101	Res,Chip	100Ω	D 1/16W
RH38	24998101	Res,Chip	100Ω	D 1/16W
RH39	24998101	Res,Chip	100Ω	D 1/16W
RH40	24998101	Res,Chip	100Ω	D 1/16W
RH41	24998101	Res,Chip	100Ω	D 1/16W
RH42	24998101	Res,Chip	100Ω	D 1/16W
RH43	24998101	Res,Chip	100Ω	D 1/16W
RH44	24998562	Res,Chip	5.6kΩ	D 1/16W
RH45	24998330	Res,Chip	33Ω	D 1/16W
RH46	24998100	Res,Chip	10Ω	D 1/16W
RH47	24998100	Res,Chip	10Ω	D 1/16W
RH48	24998100	Res,Chip	10Ω	D 1/16W
RH49	24998100	Res,Chip	10Ω	D 1/16W
RH66	24998103	Res,Chip	10kΩ	D 1/16W
RH67	24998101	Res,Chip	100Ω	D 1/16W
RH68	24998201	Res,Chip	200Ω	D 1/16W
RH69	24000445	Res,Chip Jumper	0Ω	
RJ01	24998183	Res,Chip	18kΩ	D 1/16W
RJ02	24998473	Res,Chip	47kΩ	D 1/16W
RJ03	24998222	Res,Chip	2.2kΩ	D 1/16W
RJ04	24998563	Res,Chip	56kΩ	D 1/16W
RJ05	24998563	Res,Chip	56kΩ	D 1/16W
RJ06	24998334	Res,Chip	330kΩ	D 1/16W
RJ07	24998103	Res,Chip	10kΩ	D 1/16W
RJ08	24998104	Res,Chip	100kΩ	D 1/16W
RJ09	24998472	Res,Chip	4.7kΩ	D 1/16W
RJ10	24998103	Res,Chip	10kΩ	D 1/16W
RJ11	24998104	Res,Chip	100kΩ	D 1/16W
RJ12	24998472	Res,Chip	4.7kΩ	D 1/16W
RJ13	24998103	Res,Chip	10kΩ	D 1/16W
RJ14	24998392	Res,Chip	3.9kΩ	D 1/16W
RJ16	24998510	Res,Chip	51Ω	D 1/16W
RJ18	24011105	Res,Chip	1MΩ	J 1/20W
RJ20	24998272	Res,Chip	2.7kΩ	D 1/16W
RJ22	24000445	Res,Chip Jumper	0Ω	
RJ23	24998182	Res,Chip	1.8kΩ	D 1/16W
RJ24	24998471	Res,Chip	470Ω	D 1/16W
RJ26	24000445	Res,Chip Jumper	0Ω	
RJ27	24000445	Res,Chip Jumper	0Ω	
RJ29	24998183	Res,Chip	18kΩ	D 1/16W
RJ30	24998102	Res,Chip	1kΩ	D 1/16W
RJ31	24998471	Res,Chip	470Ω	D 1/16W
RJ32	24998102	Res,Chip	1kΩ	D 1/16W
RJ33	24998183	Res,Chip	18kΩ	D 1/16W
RJ34	24998333	Res,Chip	33kΩ	D 1/16W
RJ35	24998202	Res,Chip	2kΩ	D 1/16W
RJ36	24998202	Res,Chip	2kΩ	D 1/16W
RJ37	24998153	Res,Chip	15kΩ	D 1/16W
RJ38	24998123	Res,Chip	12kΩ	D 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RJ39	24998821	Res,Chip	820Ω	D 1/16W
RJ40	24998103	Res,Chip	10kΩ	D 1/16W
RJ41	24998153	Res,Chip	15kΩ	D 1/16W
RJ42	24998202	Res,Chip	2kΩ	D 1/16W
RJ43	24998272	Res,Chip	2.7kΩ	D 1/16W
RJ44	24000445	Res,Chip Jumper	0Ω	
RJ46	24998203	Res,Chip	20kΩ	D 1/16W
RJ47	24998333	Res,Chip	33kΩ	D 1/16W
RJ48	24998333	Res,Chip	33kΩ	D 1/16W
RJ49	24000445	Res,Chip Jumper	0Ω	
RJ60	24998102	Res,Chip	1kΩ	D 1/16W
RJ62	24998334	Res,Chip	330kΩ	D 1/16W
RJ63	24998103	Res,Chip	10kΩ	D 1/16W
RJ66	24998102	Res,Chip	1kΩ	D 1/16W
RJ67	24998153	Res,Chip	15kΩ	D 1/16W
RJ68	24998332	Res,Chip	3.3kΩ	D 1/16W
RJ69	24998222	Res,Chip	2.2kΩ	D 1/16W
RJ70	24998153	Res,Chip	15kΩ	D 1/16W
RJ71	24998223	Res,Chip	22kΩ	D 1/16W
RJ72	24998102	Res,Chip	1kΩ	D 1/16W
RJ74	24998153	Res,Chip	15kΩ	D 1/16W
RJ75	24998202	Res,Chip	2kΩ	D 1/16W
RJ76	24011105	Res,Chip	1MΩ	J 1/20W
RJ77	24998103	Res,Chip	10kΩ	D1/16W
RJ78	24998183	Res,Chip	18kΩ	D 1/16W
RJ79	24998113	Res,Chip	11kΩ	D1/16W
RJ80	24998273	Res,Chip	27kΩ	D 1/16W
RJ81	24998752	Res,Chip	7.5kΩ	D 1/16W
RJ82	24998122	Res,Chip	1.2kΩ	D 1/16W
RJ83	24998101	Res,Chip	100Ω	D 1/16W
RJ84	24998103	Res,Chip	10kΩ	D1/16W
RJ85	24998203	Res,Chip	20kΩ	D1/16W
RJ86	24998203	Res,Chip	20kΩ	D1/16W
RJ87	24998222	Res,Chip	2.2kΩ	D 1/16W
RJ88	24998101	Res,Chip	100Ω	D 1/16W
RJ89	24998333	Res,Chip	33kΩ	D 1/16W
RJ90	24998101	Res,Chip	100Ω	D 1/16W
RJ91	24998101	Res,Chip	100Ω	D 1/16W
RJ92	24998334	Res,Chip	330kΩ	D 1/16W
RJ93	24998334	Res,Chip	330kΩ	D 1/16W
RL01	24998151	Res,Chip	150Ω	D 1/16W
RL02	24998151	Res,Chip	150Ω	D 1/16W
RL03	24998242	Res,Chip	2.4kΩ	D 1/16W
RL04	24998822	Res,Chip	8.2kΩ	D 1/16W
RL05	24998122	Res,Chip	1.2kΩ	D 1/16W
RL06	24998102	Res,Chip	1kΩ	D 1/16W
RL08	24998242	Res,Chip	2.4kΩ	D 1/16W
RL09	24998101	Res,Chip	100Ω	D 1/16W
RL10	24998112	Res,Chip	1.1kΩ	D 1/16W
RL12	24998242	Res,Chip	2.4kΩ	D 1/16W
RL13	24998102	Res,Chip	1kΩ	D 1/16W
RL15	24998302	Res,Chip	3kΩ	D 1/16W
RL16	24998242	Res,Chip	2.4kΩ	D 1/16W
RL17	24998750	Res,Chip	75kΩ	D 1/16W
RL18	24998912	Res,Chip	9.1kΩ	D 1/16W
RL19	24998621	Res,Chip	620Ω	D 1/16W
RL20	24998182	Res,Chip	1.8kΩ	D 1/16W
RL21	24998150	Res,Chip	15Ω	D 1/16W
RL22	24998152	Res,Chip	1.5kΩ	D 1/16W
RL23	24998300	Res,Chip	30Ω	D 1/16W
RL24	24998102	Res,Chip	1kΩ	D 1/16W
RL25	24998102	Res,Chip	1kΩ	D 1/16W
RL26	24998432	Res,Chip	4.3kΩ	D 1/16W
RL27	24998241	Res,Chip	240Ω	D 1/16W
RL28	24998222	Res,Chip	2.2kΩ	D 1/16W
RL29	24998101	Res,Chip	100Ω	D 1/16W
RL30	24998152	Res,Chip	1.5kΩ	D 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RL31	24998270	Res,Chip	27Ω	D 1/16W
RL32	24998102	Res,Chip	1kΩ	D 1/16W
RL33	24998102	Res,Chip	1kΩ	D 1/16W
RL34	24998101	Res,Chip	100Ω	D 1/16W
RL35	24998392	Res,Chip	3.9kΩ	D 1/16W
RL36	24998330	Res,Chip	33Ω	D 1/16W
RL37	24998202	Res,Chip	2kΩ	D 1/16W
RL38	24998911	Res,Chip	910Ω	D 1/16W
RL39	24998103	Res,Chip	10kΩ	D 1/16W
RL40	24998112	Res,Chip	1.1kΩ	D 1/16W
RL41	24998122	Res,Chip	1.2kΩ	D 1/16W
RL42	24998112	Res,Chip	1.1kΩ	D 1/16W
RL43	24998103	Res,Chip	10kΩ	D 1/16W
RL44	24998112	Res,Chip	1.1kΩ	D 1/16W
RL45	24998910	Res,Chip	91Ω	D 1/16W
RL46	24998750	Res,Chip	75kΩ	D 1/16W
RL47	24998151	Res,Chip	150Ω	D 1/16W
RL49	24998152	Res,Chip	1.5kΩ	D 1/16W
RL50	24069099	Res,Variable,Chip	200Ω	1/10W
RL51	24069099	Res,Variable,Chip	200Ω	1/10W
RL52	24069064	Res,Variable,Chip	1kΩ	1/10W
RL53	24998241	Res,Chip	240Ω	D 1/16W
RL54	24998241	Res,Chip	240Ω	D1/16W
RL55	24998241	Res,Chip	240Ω	D 1/16W
RL56	24998101	Res,Chip	100Ω	D 1/16W
RL57	24998821	Res,Chip	820Ω	D 1/16W
RL58	24998822	Res,Chip	8.2kΩ	D 1/16W
RL60	24998152	Res,Chip	1.5kΩ	D 1/16W
RL61	24998221	Res,Chip	200Ω	D 1/16W
RL62	24998222	Res,Chip	2.2kΩ	D 1/16W
RL63	24998122	Res,Chip	1.2kΩ	D 1/16W
RL64	24998102	Res,Chip	1kΩ	D 1/16W
RL65	24998152	Res,Chip	1.5kΩ	D 1/16W
RL66	24998201	Res,Chip	200Ω	D 1/16W
RL67	24998222	Res,Chip	2.2kΩ	D 1/16W
RL68	24998122	Res,Chip	1.2kΩ	D 1/16W
RL69	24998102	Res,Chip	1kΩ	D 1/16W
RL70	24998201	Res,Chip	200Ω	D 1/16W
RL71	24998562	Res,Chip	5.6kΩ	D 1/16W
RL72	24998432	Res,Chip	4.3kΩ	D 1/16W
RL73	24998332	Res,Chip	3.3kΩ	D 1/16W
RL74	24998102	Res,Chip	1kΩ	D 1/16W
RL75	24998152	Res,Chip	1.5kΩ	D 1/16W
RL76	24998302	Res,Chip	3kΩ	D 1/16W
RL77	24998332	Res,Chip	3.3kΩ	D 1/16W
RL78	24998102	Res,Chip	1kΩ	D 1/16W
RL79	24998511	Res,Chip	510Ω	D 1/16W
RL80	24998302	Res,Chip	3kΩ	D 1/16W
RL81	24998332	Res,Chip	3.3kΩ	D 1/16W
RL82	24998752	Res,Chip	7.5kΩ	D 1/16W
RL83	24998273	Res,Chip	27kΩ	D 1/16W
RL84	24998303	Res,Chip	30kΩ	D 1/16W
RL85	24998203	Res,Chip	20kΩ	D 1/16W
RL86	24011754	Res,Chip	750kΩ	J 1/20W
RL87	24011754	Res,Chip	750kΩ	J 1/20W
RL88	24998103	Res,Chip	10kΩ	D 1/16W
RL90	24000445	Res,Chip Jumper	0Ω	
RL91	24998393	Res,Chip	390kΩ	D 1/16W
RL92	24998563	Res,Chip	56kΩ	D 1/16W
RL93	24998823	Res,Chip	82kΩ	D 1/16W
RL94	24998203	Res,Chip	20kΩ	D 1/16W
RL95	24998102	Res,Chip	1kΩ	D 1/16W
RL96	24998102	Res,Chip	1kΩ	D 1/16W
RL97	24998391	Res,Chip	390Ω	D 1/16W
RL98	24998152	Res,Chip	1.5kΩ	D 1/16W
RR01	24998821	Res,Chip	820Ω	D 1/16W
RR02	24998334	Res,Chip	330kΩ	D 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RR03	24998392	Res,Chip	3.9kΩ	D 1/16W
RR04	24998202	Res,Chip	2kΩ	D 1/16W
RR05	24998821	Res,Chip	820Ω	D 1/16W
RR06	24998112	Res,Chip	1.1kΩ	D 1/16W
RR07	24998472	Res,Chip	4.7kΩ	D 1/16W
RR08	24998102	Res,Chip	1kΩ	D 1/16W
RR09	24998152	Res,Chip	1.5kΩ	D 1/16W
RR10	24998560	Res,Chip	56Ω	D 1/16W
RR11	24998122	Res,Chip	1.2kΩ	D 1/16W
RR12	24998302	Res,Chip	3kΩ	D 1/16W
RR14	24998201	Res,Chip	200Ω	D 1/16W
RR15	24998303	Res,Chip	30kΩ	D 1/16W
RR16	24998101	Res,Chip	100Ω	D 1/16W
RR17	24998332	Res,Chip	3.3kΩ	D 1/16W
RR18	24998101	Res,Chip	100Ω	D 1/16W
RR19	24998101	Res,Chip	100Ω	D 1/16W
RR20	24998332	Res,Chip	3.3kΩ	D 1/16W
RR21	24998101	Res,Chip	100Ω	D 1/16W
RR22	24998622	Res,Chip	6.2kΩ	D 1/16W
RR23	24998362	Res,Chip	3.6kΩ	D 1/16W
RR24	24998152	Res,Chip	1.5kΩ	D 1/16W
RR25	24998432	Res,Chip	4.3kΩ	D 1/16W
RR26	24998750	Res,Chip	75kΩ	D 1/16W
RR27	24998202	Res,Chip	2kΩ	D 1/16W
RR28	24998101	Res,Chip	100Ω	D 1/16W
RR29	24998560	Res,Chip	56Ω	D 1/16W
RR30	24998471	Res,Chip	470Ω	D 1/16W
RR32	24998270	Res,Chip	27Ω	D 1/16W
RS01	24998562	Res,Chip	5.6kΩ	D 1/16W
RS02	24998562	Res,Chip	5.6kΩ	D 1/16W
RS03	24998223	Res,Chip	22kΩ	D 1/16W
RS04	24998154	Res,Chip	150kΩ	D 1/16W
RS05	24998304	Res,Chip	300kΩ	D 1/16W
RS06	24998392	Res,Chip	3.9kΩ	D 1/16W
RS07	24998622	Res,Chip	6.2kΩ	D 1/16W
RS08	24998822	Res,Chip	8.2kΩ	D 1/16W
RS09	24998123	Res,Chip	12kΩ	D 1/16W
RS10	24998911	Res,Chip	910Ω	D 1/16W
RS11	24998822	Res,Chip	8.2kΩ	D 1/16W
RS21	24998202	Res,Chip	2kΩ	D 1/16W
RS22	24998822	Res,Chip	8.2kΩ	D 1/16W
RT01	24998181	Res,Chip	180kΩ	D 1/16W
RT02	24998562	Res,Chip	5.6kΩ	D 1/16W
RT03	24998202	Res,Chip	2kΩ	D 1/16W
RT04	24998181	Res,Chip	180kΩ	D 1/16W
RT05	24998562	Res,Chip	5.6kΩ	D 1/16W
RT06	24998202	Res,Chip	2kΩ	D 1/16W
RT07	24998223	Res,Chip	22kΩ	D 1/16W
RT08	24998332	Res,Chip	3.3kΩ	D 1/16W
RT09	24998183	Res,Chip	18kΩ	D 1/16W
RT10	24998103	Res,Chip	10kΩ	D 1/16W
RT11	24998222	Res,Chip	2.2kΩ	D 1/16W
RT12	24998332	Res,Chip	3.3kΩ	D 1/16W
RT13	24998332	Res,Chip	3.3kΩ	D 1/16W
RT14	24998822	Res,Chip	8.2kΩ	D 1/16W
RT15	24998753	Res,Chip	75kΩ	D 1/16W
RT16	24998223	Res,Chip	22kΩ	D 1/16W
RT17	24989064	Res,Chip	0.1Ω	D 1/8W
RT18	24989064	Res,Chip	0.1Ω	D 1/8W
RT19	24998471	Res,Chip	470Ω	D 1/16W
RT20	24998332	Res,Chip	3.3kΩ	D 1/16W
RT21	24998272	Res,Chip	2.7kΩ	D 1/16W
RT22	24998334	Res,Chip	330kΩ	D 1/16W
RT23	24998562	Res,Chip	5.6kΩ	D 1/16W
		- MISCELLANEOUS -		
LT02A	23464853	Shilding	Shildban	
PH01	23713141	Connector	60P	

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
PH02	70164750	Connector	20P
PH03	23713139	Connector	28P
PT01	70164710	Socket	12P
ZB01	70132535	Ferrite	T629EKN-1681
ZB02	70132502	Ferrite	T629LKN-1476
ZB03	23103889	Filter	BK1608TS102T
ZB04	23103889	Filter	BK1608TS102T
ZD01	23103889	Filter	BK1608TS102T
ZD02	23103889	Filter	BK1608TS102T
ZG01	70132535	Ferrite	T629EKN-1681
ZG02	70132502	Ferrite	T629LKN-1476
ZG03	23103889	Filter	BK1608TS102T
ZG04	23103889	Filter	BK1608TS102T
ZH01	23103889	Filter	BK1608TS102T
ZH02	23355951	Oscillator	VCXO-190 28MHz
ZH03	23103889	Filter	BK1608TS102T
ZJ01	23103889	Filter	BK1608TS102T
ZJ02	23355950	Oscillator	VC-FXO-35F 14MHz
ZJ03	23303091	Filter,Chip	FILTER1033
ZL01	23103889	Filter	BK1608TS102T
ZL02	24000445	Res,Chip Jumper	0Ω
ZL03	70132504	Ferrite	T630EMN-1474
ZL04	70132504	Ferrite	T630EMN-1474
ZL05	23250153	Delay line	628BIN-1520
ZR01	70132535	Ferrite	T629EKN-1681
ZR02	70132502	Ferrite	T629LKN-1476
ZR03	23103889	Filter	BK1608TS102T
ZR04	23103889	Filter	BK1608TS102T
ZS01	23103889	Filter	BK1608TS102T
ZS02	23103889	Filter	BK1608TS102T
■ UC02	23785337	PC Board Assy	DSP(PB9606-2)
		- INTEGRATED CIRCUITS -	
QA02	70200502	IC	PST9128NR
QA05	23906964	IC	MAX3226CAE
QM03	23906654	IC	IP00C702
QM05	23906654	IC	IP00C702
QM16	70200698	IC	CXD2309Q
QM17	B0486645	IC	TC74VHCT541AFT
QN01	70200809	IC	MAX4181EUT
QN04	70200809	IC	MAX4181EUT
QN07	70200809	IC	MAX4181EUT
		- TRANSISTORS -	
QA03	23000491	IC	AK6440AM
QA04	23000490	IC	MB90097PFV
QA06	A6030695	IC	TC7SH32FU
QA07	A6030695	IC	TC7SH32FU
QA08	A6030695	IC	TC7SH32FU
QK01	23000494	IC	SN65LVDS387
QK02	23000494	IC	SN65LVDS387
QK03	23000496	IC	SN65LVDT2
QK04	23000495	IC	SN65LVDS1
QK05	23000495	IC	SN65LVDS1
QK06	23000495	IC	SN65LVDS1
QM01	23000497	IC	XCS30XL-4PQ
QM02	23000502	IC	XC17S30XL-2
QM04	23000198	IC	EM636327Q-8
QM06	23000198	IC	EM636327Q-8
QM07	A6030695	IC	TC7SH32FU
QM09	A6030695	IC	TC7SH32FU
QM10	A6030695	IC	TC7SH32FU
QM11	A6030695	IC	TC7SH32FU
QM12	A6030695	IC	TC7SH32FU
QM14	A6030695	IC	TC7SH32FU
QM15	A6030695	IC	TC7SH32FU
QN02	23000482	IC	MAX4330EUK
QN03	23000481	IC	AD9203ARU

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
QN05	23000482	IC	MAX4330EUK	
QN06	23000481	IC	AD9203ARU	
QN08	23000482	IC	MAX4330EUK	
QN09	23000481	IC	AD9203ARU	
QN10	23000499	IC	XCS30XL-4TQ	
QN11	23000611	IC	XC17S30XLV08	
QN12	A6030695	IC	TC7SH32FU	
		- DIODES -		
DA03	23357218	Diode	RD4.3MW	
DA04	23357218	Diode	RD4.3MW	
DA05	23357218	Diode	RD4.3MW	
DA06	23357218	Diode	RD4.3MW	
DA07	23357218	Diode	RD4.3MW	
DA08	23357218	Diode	RD4.3MW	
DK01	70115496	Diode	RD6.2Z	
DK02	23357238	Diode	RD16MW	
		- COILS -		
LA01	23245837	Coil,Chip	39µH	
LA02	23246312	Coil,Chip	22µH	
LM01	23246312	Coil,Chip	22µH	
LM02	23246312	Coil,Chip	22µH	
LN01	23246312	Coil,Chip	22µH	
LN02	23245851	Coil,Chip	22µH	
		- CAPACITORS -		
CA01	24092730	Cap,Chip	0.1µF	K 16V
CA02	24105300	Cap,Chip	30pF	J 50V
CA03	24105300	Cap,Chip	30pF	J 50V
CA04	24092730	Cap,Chip	0.1µF	K 16V
CA05	24105300	Cap,Chip	30pF	J 50V
CA07	24092730	Cap,Chip	0.1µF	K 16V
CA08	24092730	Cap,Chip	0.1µF	K 16V
CA09	24092730	Cap,Chip	0.1µF	K 16V
CA10	24092730	Cap,Chip	0.1µF	K 16V
CA11	24092730	Cap,Chip	0.1µF	K 16V
CA12	24088080	Cap,Chip,Tantalum	33µF	M 10V
CA14	24092730	Cap,Chip	0.1µF	K 16V
CA15	24092730	Cap,Chip	0.1µF	K 16V
CA16	24092730	Cap,Chip	0.1µF	K 16V
CA50	24093917	Cap,Variable,Chip	20pF	
CK01	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CK02	24092730	Cap,Chip	0.1µF	K 16V
CK03	24092730	Cap,Chip	0.1µF	K 16V
CK04	24092730	Cap,Chip	0.1µF	K 16V
CK05	24092730	Cap,Chip	0.1µF	K 16V
CK06	24109103	Cap,Chip	0.01µF	K 25V
CM01	24088080	Cap,Chip,Tantalum	33µF	M 10V
CM02	24092730	Cap,Chip	0.1µF	K 16V
CM03	24092730	Cap,Chip	0.1µF	K 16V
CM04	24092730	Cap,Chip	0.1µF	K 16V
CM05	24092730	Cap,Chip	0.1µF	K 16V
CM06	24088080	Cap,Chip,Tantalum	33µF	M 10V
CM07	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CM08	24092730	Cap,Chip	0.1µF	K 16V
CM09	24092730	Cap,Chip	0.1µF	K 16V
CM11	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CM12	24092730	Cap,Chip	0.1µF	K 16V
CM13	24092730	Cap,Chip	0.1µF	K 16V
CM14	24092730	Cap,Chip	0.1µF	K 16V
CM16	24092730	Cap,Chip	0.1µF	K 16V
CM17	24092730	Cap,Chip	0.1µF	K 16V
CM18	24092730	Cap,Chip	0.1µF	K 16V
CM20	24092730	Cap,Chip	0.1µF	K 16V
CM21	24092730	Cap,Chip	0.1µF	K 16V
CM22	24092730	Cap,Chip	0.1µF	K 16V
CM25	24092730	Cap,Chip	0.1µF	K 16V
CM26	24092730	Cap,Chip	0.1µF	K 16V
CM27	24088099	Cap,Chip,Tantalum	10µF	M 6.3V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CM28	24088979	Chip,Cap,Tantalum	1µF	M 25V
CM29	24092730	Cap,Chip	0.1µF	K 16V
CM30	24088080	Cap,Chip,Tantalum	33µF	M 10V
CM31	24092621	Cap,Chip	1µF	K 10V
CM32	24105470	Cap,Chip	47pF	J 50V
CN01	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN02	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN03	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN04	24092611	Cap,Chip	2.2µF	K 6.3V
CN05	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CN06	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN07	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN09	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN11	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN12	24088100	Cap,Chip,Tantalum	4.7µF	M 10V
CN13	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN14	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN15	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN16	24092611	Cap,Chip	2.2µF	K 6.3V
CN18	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN19	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN21	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN23	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN24	24088100	Cap,Chip,Tantalum	4.7µF	M 10V
CN25	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN26	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN27	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN28	24092611	Cap,Chip	2.2µF	K 6.3V
CN30	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN31	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN33	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN35	24088078	Cap,Chip,Tantalum	15µF	M 6.3V
CN36	24088100	Cap,Chip,Tantalum	4.7µF	M 10V
CN38	24092730	Cap,Chip	0.1µF	K 16V
CN39	24092730	Cap,Chip	0.1µF	K 16V
CN40	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CN41	24092730	Cap,Chip	0.1µF	K 16V
CN44	24092730	Cap,Chip	0.1µF	K 16V
CN45	24092730	Cap,Chip	0.1µF	K 16V
CN46	24092730	Cap,Chip	0.1µF	K 16V
CN47	24088103	Cap,Chip,Tantalum	100µF	M 6.3V
CN48	24092730	Cap,Chip	0.1µF	K 16V
CN49	24092730	Cap,Chip	0.1µF	K 16V
		- RESISTORS -		
RA01	24998393	Res,Chip	390kΩ	D 1/16W
RA03	24998473	Res,Chip	47kΩ	D 1/16W
RA04	24000565	Cap,Chip	15kΩx4	J 1/16W
RA05	24998393	Res,Chip	390kΩ	D 1/16W
RA06	24000565	Cap,Chip	15kΩx4	J 1/16W
RA07	24019346	Cap,Chip	100Ωx4	J 1/16W
RA08	24998472	Res,Chip	4.7kΩ	D 1/16W
RA10	24998153	Res,Chip	15kΩ	D 1/16W
RA11	24998393	Res,Chip	390kΩ	D 1/16W
RA13	24998153	Res,Chip	15kΩ	D 1/16W
RM03	24000445	Res,Chip Jumper	0Ω	
RM04	24998472	Res,Chip	4.7kΩ	D 1/16W
RM05	24998472	Res,Chip	4.7kΩ	D 1/16W
RM07	24998101	Res,Chip	100Ω	D 1/16W
RM08	24998302	Res,Chip	3kΩ	D 1/16W
RM09	24998133	Cap,Chip	13kΩ	D 1/16W
RM10	24998203	Res,Chip	20kΩ	D 1/16W
RM11	24998752	Res,Chip	7.5kΩ	D 1/16W
RM12	24000445	Res,Chip Jumper	0Ω	
RM14	24998100	Res,Chip	10Ω	D 1/16W
RN01	24998821	Res,Chip	820Ω	D 1/16W
RN02	24998202	Res,Chip	2kΩ	D 1/16W
RN03	24998150	Res,Chip	15Ω	D 1/16W
RN04	24998512	Cap,Chip	5.1kΩ	D 1/16W
RN05	24998332	Res,Chip	3.3kΩ	D 1/16W
RN06	24998103	Res,Chip	10kΩ	D 1/16W
RN07	24998153	Res,Chip	15kΩ	D 1/16W
RN08	24998132	Res,Chip	1.3kΩ	D 1/16W
RN09	24998821	Res,Chip	820Ω	D 1/16W
RN10	24998202	Res,Chip	2kΩ	D 1/16W
RN11	24998150	Res,Chip	15Ω	D 1/16W
RN12	24998512	Cap,Chip	5.1kΩ	D 1/16W
RN13	24998332	Res,Chip	3.3kΩ	D 1/16W
RN14	24998103	Res,Chip	10kΩ	D 1/16W
RN15	24998153	Res,Chip	15kΩ	D 1/16W
RN16	24998132	Res,Chip	1.3kΩ	D 1/16W
RN17	24998821	Res,Chip	820Ω	D 1/16W
RN18	24998202	Res,Chip	2kΩ	D 1/16W
RN19	24998150	Res,Chip	15Ω	D 1/16W
RN20	24998512	Cap,Chip	5.1kΩ	D 1/16W
RN21	24998332	Res,Chip	3.3kΩ	D 1/16W
RN22	24998103	Res,Chip	10kΩ	D 1/16W
RN23	24998153	Res,Chip	15kΩ	D 1/16W
RN24	24998132	Res,Chip	1.3kΩ	D 1/16W
RN26	24998472	Res,Chip	4.7kΩ	D 1/16W
RN27	24998472	Res,Chip	4.7kΩ	D 1/16W
RN28	24998100	Res,Chip	10Ω	D 1/16W
		- MISCELLANEOUS -		
PA01	70164778	Connector	6P	
PK01	23165451	Connector	52755-1200	
PN01	23713142	Connector	60P	
QA01A	23000700	IC	MB91F109PFV	
SA01	70145427	Slide Switch	SSSS212-12	
ZA01	23355948	Ceramic,rezonetor	SACV12.5M	
ZK01	23103912	Ferrite	NFM39R12C223	
ZM01	23103912	Ferrite	NFM39R12C223	
ZM02	23103912	Ferrite	NFM39R12C223	
ZM03	23103912	Ferrite	NFM39R12C223	
ZM04	23355949	Oscillator	FX0-31FL 35MHz	
ZM05	23103889	Filter	BK1608TS102T	
ZM06	23103889	Filter	BK1608TS102T	
ZM07	23103889	Filter	BK1608TS102T	
ZM08	23103889	Filter	BK1608TS102T	
ZN02	23103889	Filter	BK1608TS102T	
ZN04	23103889	Filter	BK1608TS102T	
■ UC03	23785339	PC Board Assy	REAR(PB9606-3)	
		- DIODES -		
DC01	70115496	Diode	RD6.2Z	
DC02	70115496	Diode	RD6.2Z	
DC03	70115496	Diode	RD6.2Z	
DC04	70115496	Diode	RD6.2Z	
DC05	70115496	Diode	RD6.2Z	
DC06	70115496	Diode	RD6.2Z	
DC07	70115496	Diode	RD6.2Z	
DC08	70115496	Diode	RD6.2Z	
DC09	23357034	Diode	RB051L-40TE5	
DC10	23357034	Diode	RB051L-40TE5	
DC11	70115496	Diode	RD6.2Z	
DC12	70115496	Diode	RD6.2Z	
DC13	70115496	Diode	RD6.2Z	
DC14	70115496	Diode	RD6.2Z	
DC15	70115496	Diode	RD6.2Z	
DC16	70115496	Diode	RD6.2Z	
DC17	70115526	Diode	RD30MW	
DC18	70115496	Diode	RD6.2Z	
DC19	70115496	Diode	RD6.2Z	
		- COILS -		
LC01	23103013	Filter	TEM2020T	

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
LC02	23245853	Coil,Chip	1.5μH	
LC03	23245853	Coil,Chip	1.5μH	
LC04	23245853	Coil,Chip	1.5μH	
LC05	23245853	Coil,Chip	1.5μH	
LC06	23245853	Coil,Chip	1.5μH	
LC07	23245853	Coil,Chip	1.5μH	
LC08	23245853	Coil,Chip	1.5μH	
LC09	23245853	Coil,Chip	1.5μH	
		- CAPACITORS -		
CC01	24088979	Chip,Cap,Tantalum	1μF	M 25V
CC02	24088079	Cap,Chip,Tantalum	10μF	M 10V
CC03	24105180	Cap,Chip	18pF	J 50V
CC04	24105180	Cap,Chip	18pF	J 50V
CC05	24105180	Cap,Chip	18pF	J 50V
CC06	24105180	Cap,Chip	18pF	J 50V
CC07	24105180	Cap,Chip	18pF	J 50V
CC08	24105180	Cap,Chip	18pF	J 50V
CC09	24105180	Cap,Chip	18pF	J 50V
CC10	24105180	Cap,Chip	18pF	J 50V
		- RESISTORS -		
RC01	24998332	Res,Chip	3.3kΩ	D 1/16W
RC02	24998332	Res,Chip	3.3kΩ	D 1/16W
RC05	24998750	Res,Chip	75kΩ	D 1/16W
		- MISCELLANEOUS -		
⚠ FC01	70144821	Fuse	SSTC2A	
PC02	23713139	Connector	28P	
SC03	70145448	Switch	HSW0880	
ZC01	70417030	Surge Absorber	CLTRF41R5CC	
ZC02	70417030	Surge Absorber	CLTRF41R5CC	
■ UC04	23785340	PC Board Assy	DC(PB9606-4)	
		- MISCELLANEOUS -		
PP01	23713138	Connector	IL-WX-12	
PP02	70164785	Connector	Plug12P	
■ UC05	23785341	PC Board Assy	FRONT(PB9606-5)	
		- DIODES -		
DF01	A8690640	Diode,LED	TLUG163	
		- RESISTORS -		
RF01	24998182	Res,Chip	1.8kΩ	D 1/16W
		- MISCELLANEOUS -		
A201	23450278	Front Panel	FRONT PANEL	
A201G	70391261	Screw	2x4mm	
A201K	70391436	Screw	2x0.4x5mm	
A202	23448595	Case	CCU CASE	
A202A	70391436	Screw	CAUTION EXP IKTU40A	
A203	23540167	Bottom Cover	BOTTOM COVER	
A203A	70860194	Foot Rubber	LEG SJ5012BL	
A204	23450281	Rear Panel	REAR PANEL	
A204A	70391436	Screw	2x0.4x5mm	
A210A	70391436	Screw	2x0.4x5mm	
A701	70917916	Carton	CARTON IK642H	
A701A	23564437	Label	KOSOUBAKO IKTU51	
H001	23122392	DC-DC Converte	DDU5074	
H001A	23469291	Insulator	INSULATOR	
PC04	70165208	Receptacle	HR10A-7R-4PB	
PC05	70165277	Connector	BNC-DR-D	
PC06	70165249	Receptacle	TCS7848	
PC07	70164760	Connector	D-SUB 9P	
PC07A	70391889	Screw	STUD	
PC08	70165275	Receptacle	HR10A10R1	
PC09	70165277	Connector	BNC-DR-D	
PF01	70164764	Connector	HR25-9TR-20SA	
PF02	70164750	Connector,20P	20P	
PK01A	23737006	Screw	BOLT	

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
S001	23344457	Switch	MENBLEN SWITCH
SF01	23344442	Switch	SLIDE SWITCH
W002	70168293	Cable	FFC 20P
W003	23501462	Wire Harenss	FFC WIRE
W003A	23303240	FFC	FPC-25-12
W004	23501528	Wire	WIRE HARNESS
Y110	23563990	Owner's Manual	OWNER'S MANUAL IKTU51

(JK-TU52H)

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
		- ELECTRICAL PARTS -	
		- MISCELLANEOUS -	
A110	23540163	Front Cover	
A110A	70391917	Screw	2x5mm
A111	23540164	Back Cover	
A111A	23717035	Screw	2x10mm
A113	70869181	C Mount Cap	
A702	23564439	Label	
PF01	70164764	Connector	
Y110	23552927	Owner's Manual	

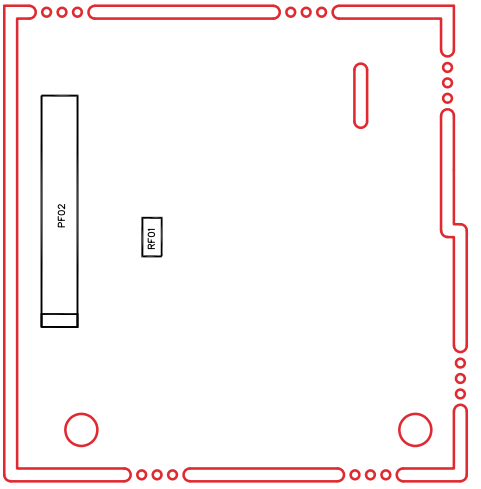
(JK-TU53H)

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
		- ELECTRICAL PARTS -	
		- MISCELLANEOUS -	
A110	23540165	Front Cover	
A110A	23717034	Screw	2x5mm
A111	23540166	Back Cover	
A111A	23717035	Screw	2x10mm
A113	70869181	C Mount Cap	
A702	23564440	Label	
PF01	70164764	Connector	
Y110	23552928	Owner's Manual	

SECTION 4
PC BOARDS AND SCHEMATIC DIAGRAMS

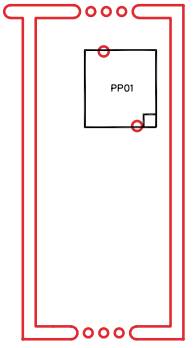
1. PC BOARDS

1-1. Front PC Board

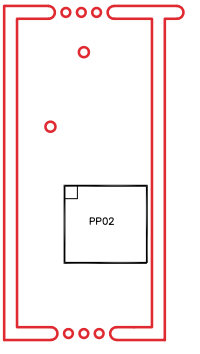


Soldering Side

1-2. DC PC Board

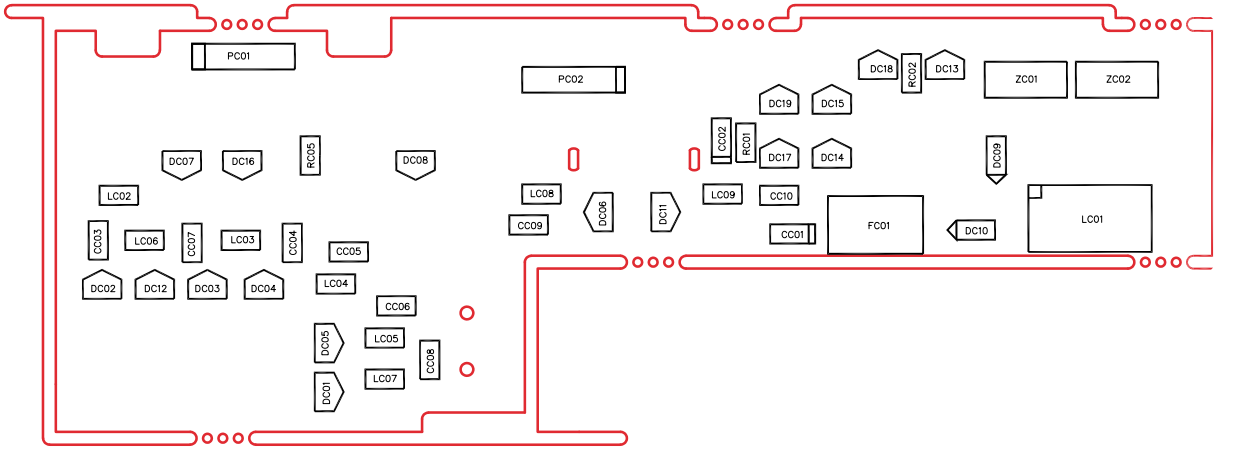


Component Side

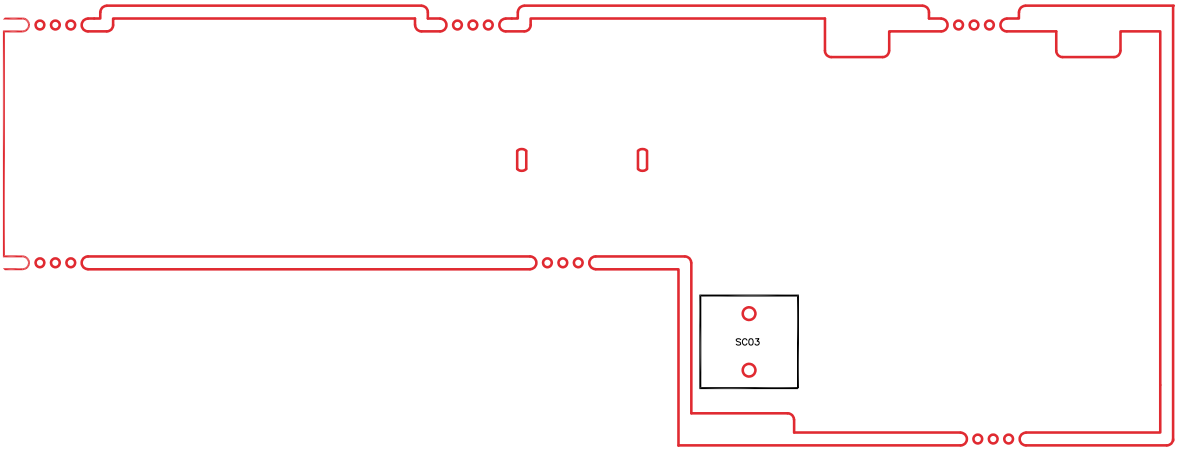


Soldering Side

1-3. Rear PC Board (IK-528A)

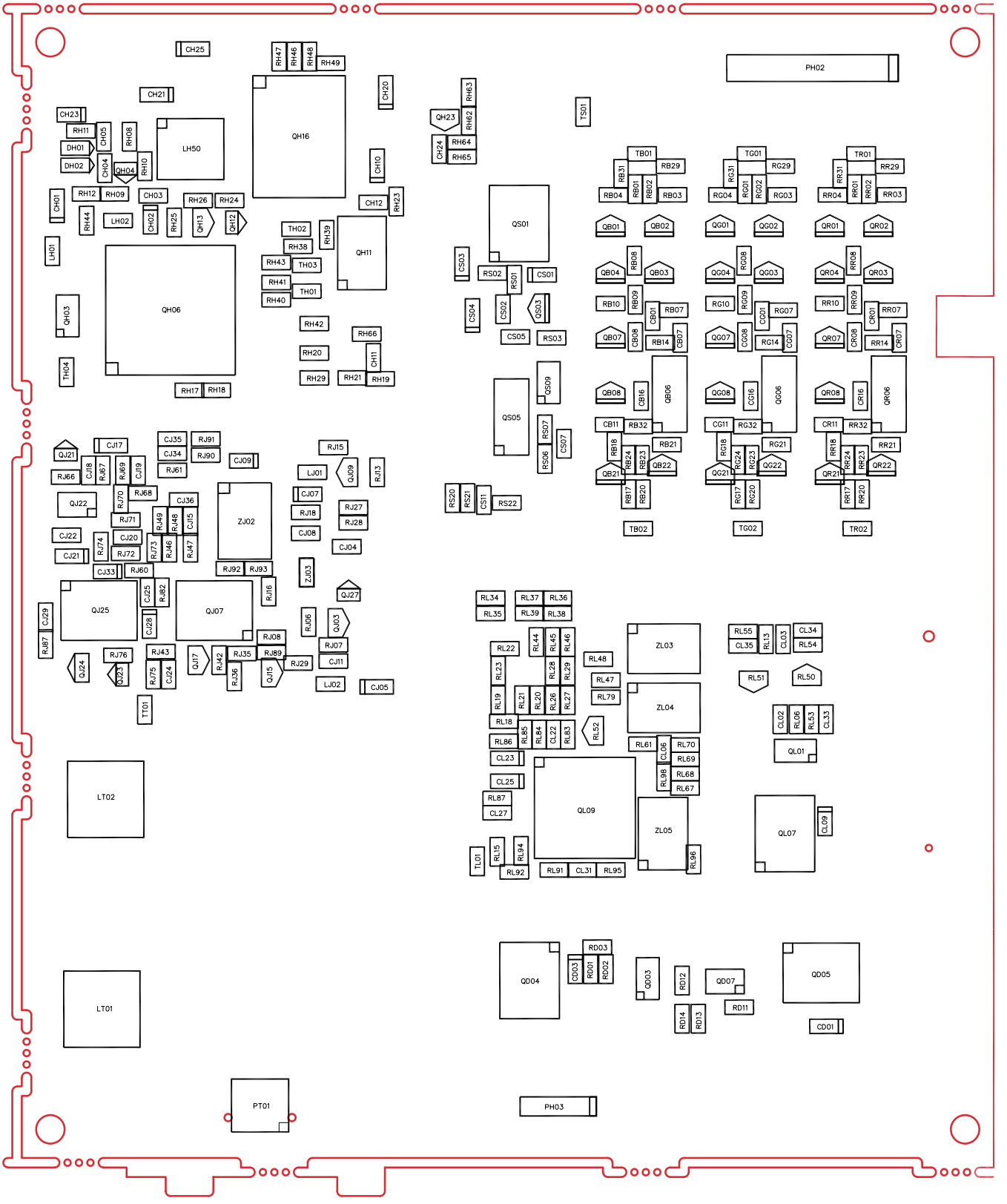


Component Side



Soldering Side

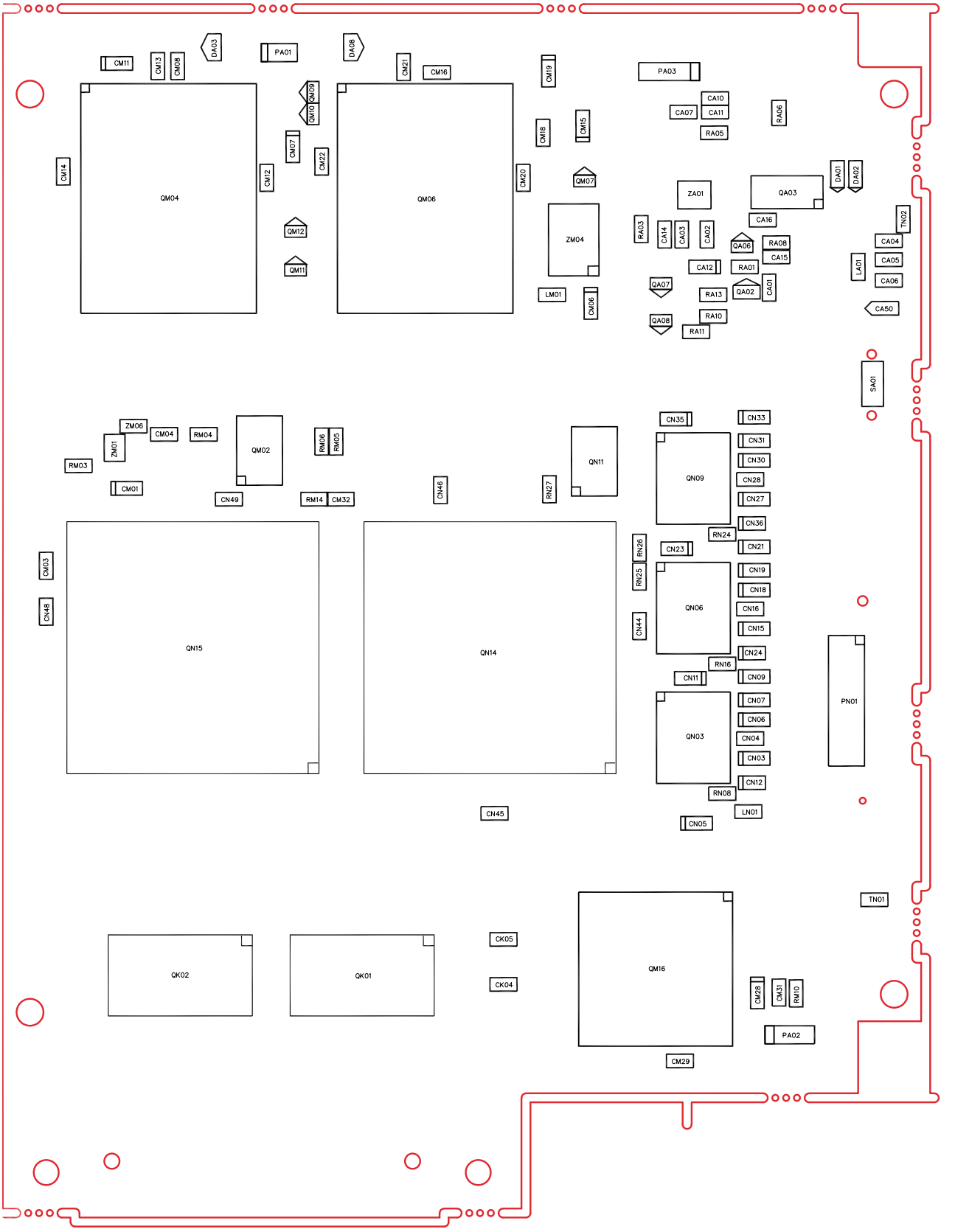
1-4. Driver PC Board



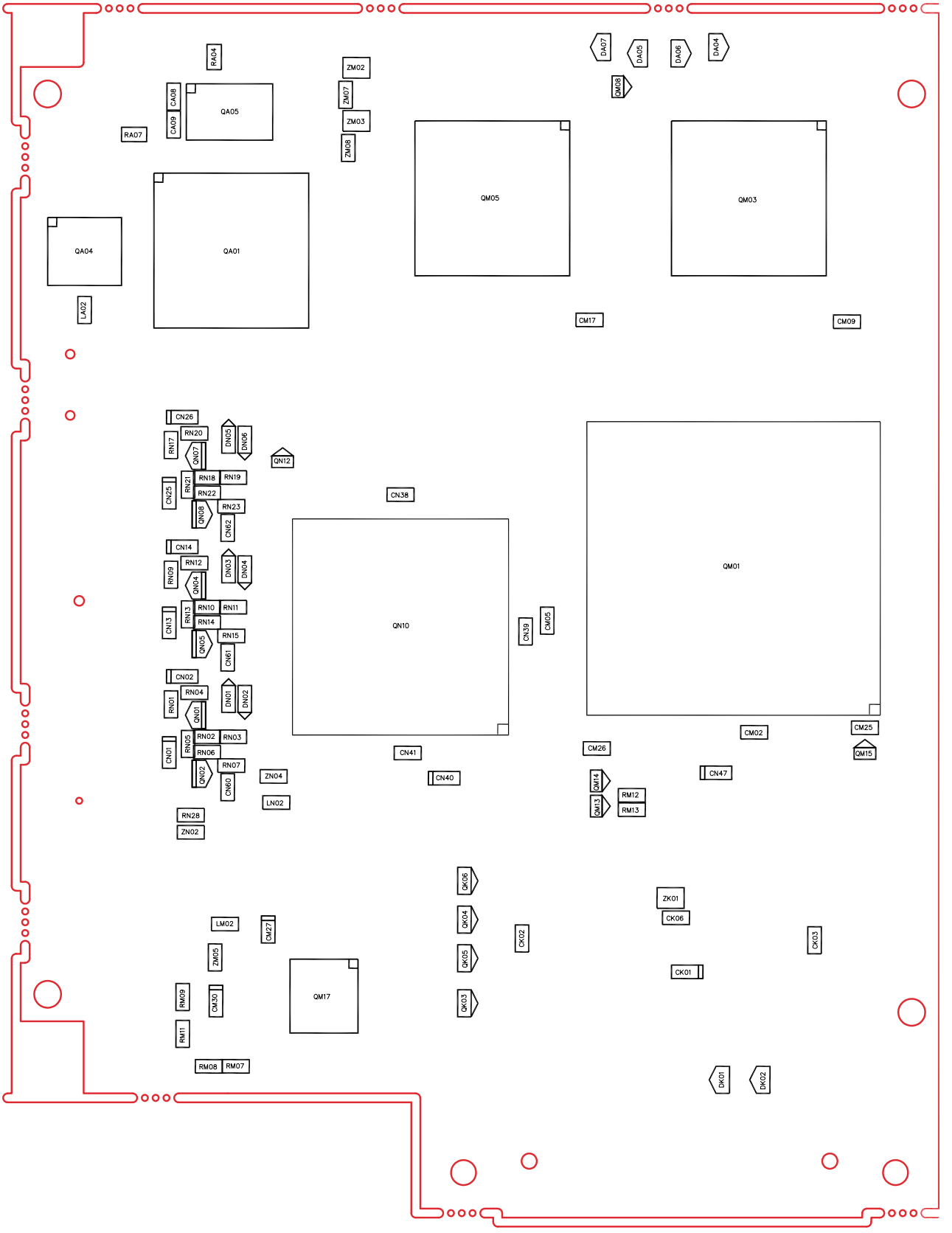
Component Side

Soldering Side

1-5. DSP PC Board



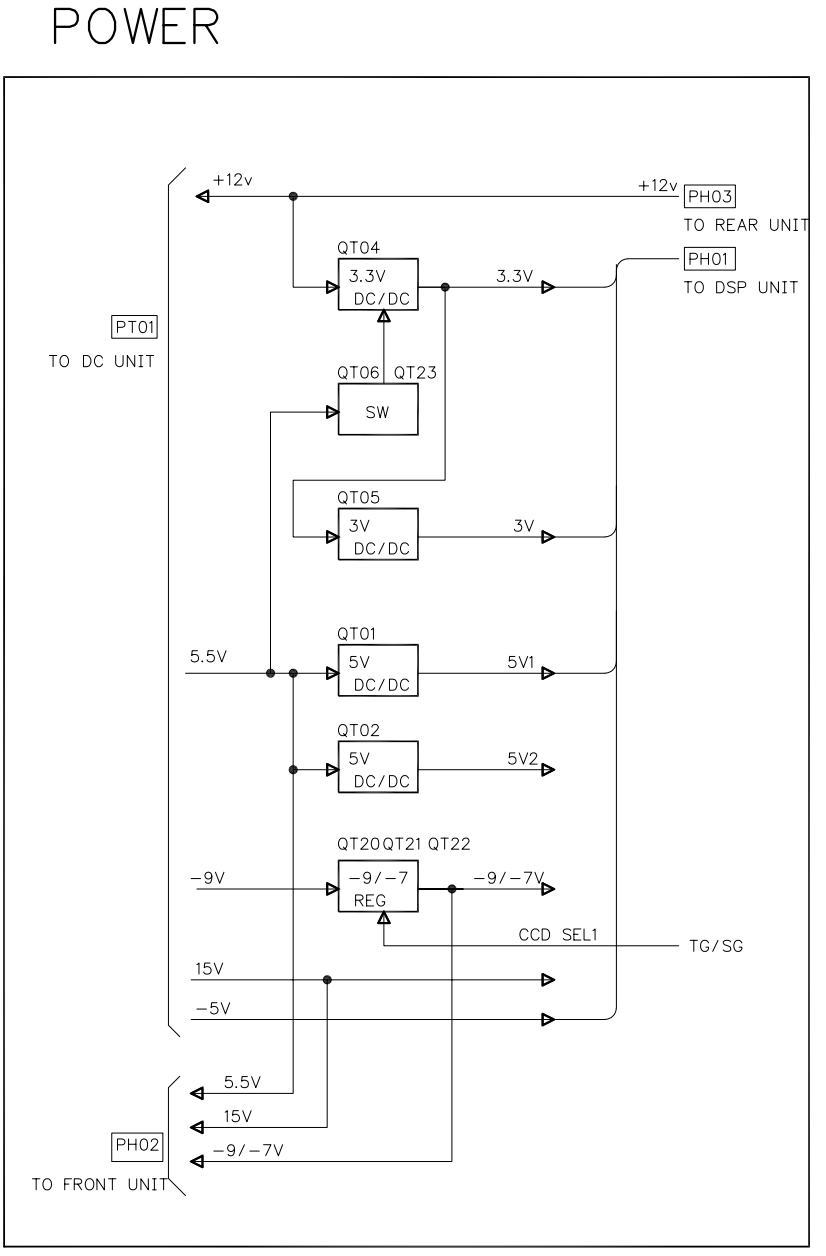
Component Side



Soldering Side

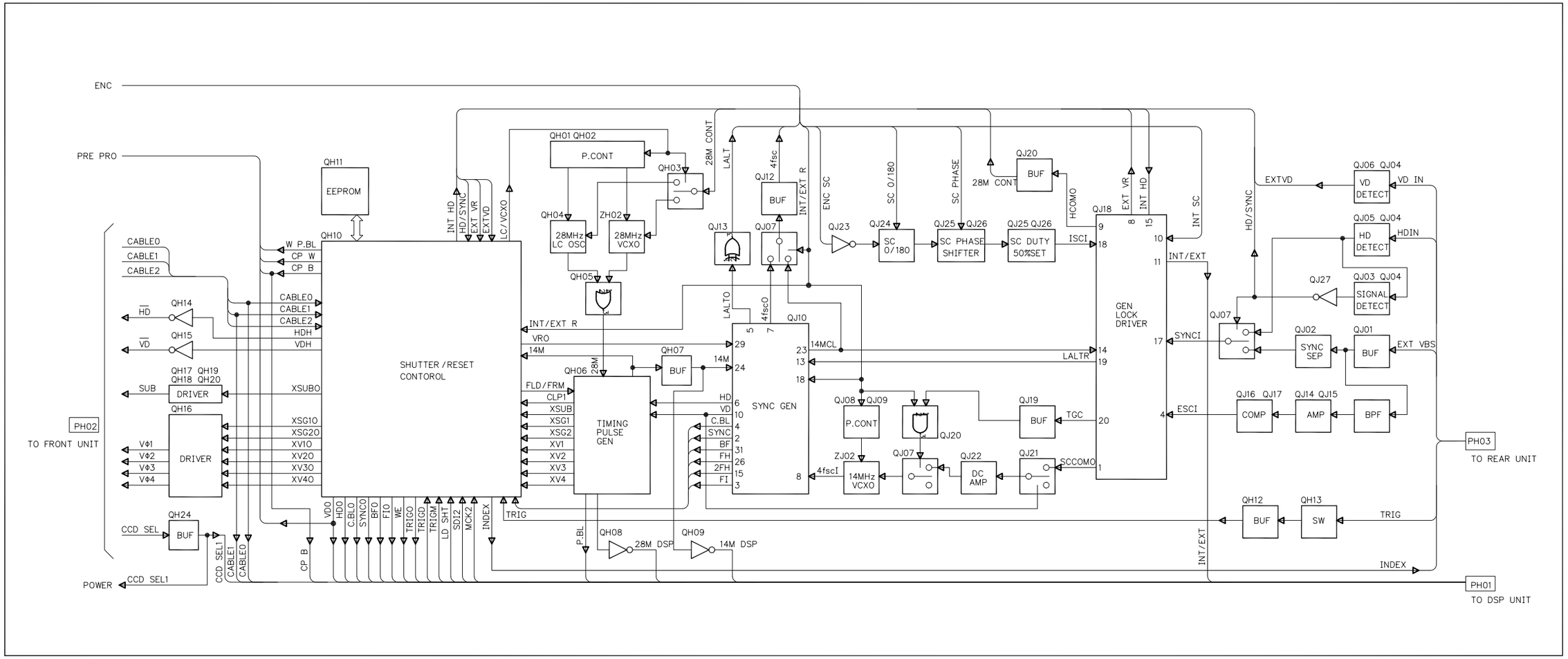
2. BLOCK DIAGRAMS

2-1. Power Supply Block Diagram

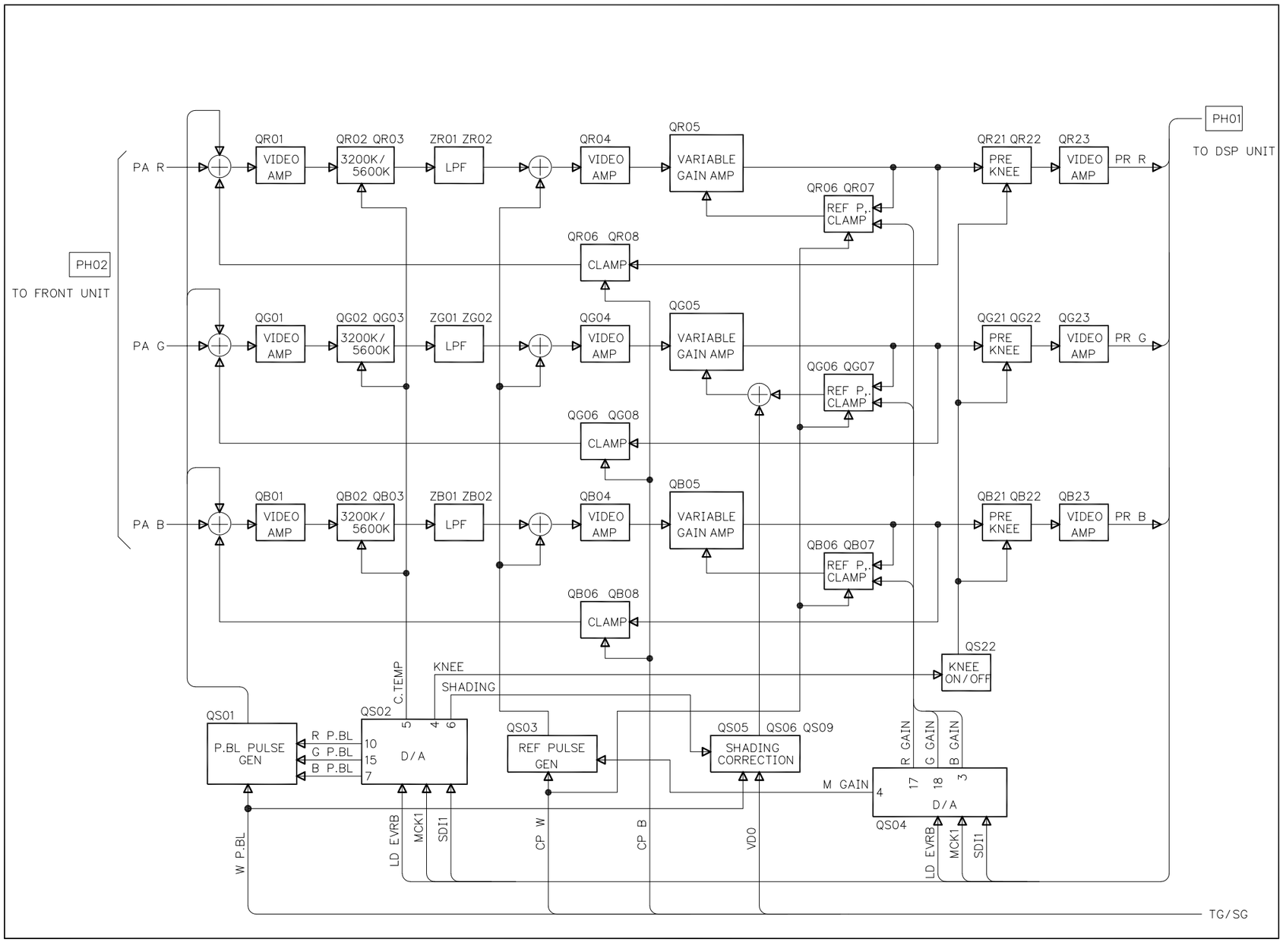


2-2. TG/SG Block Diagram

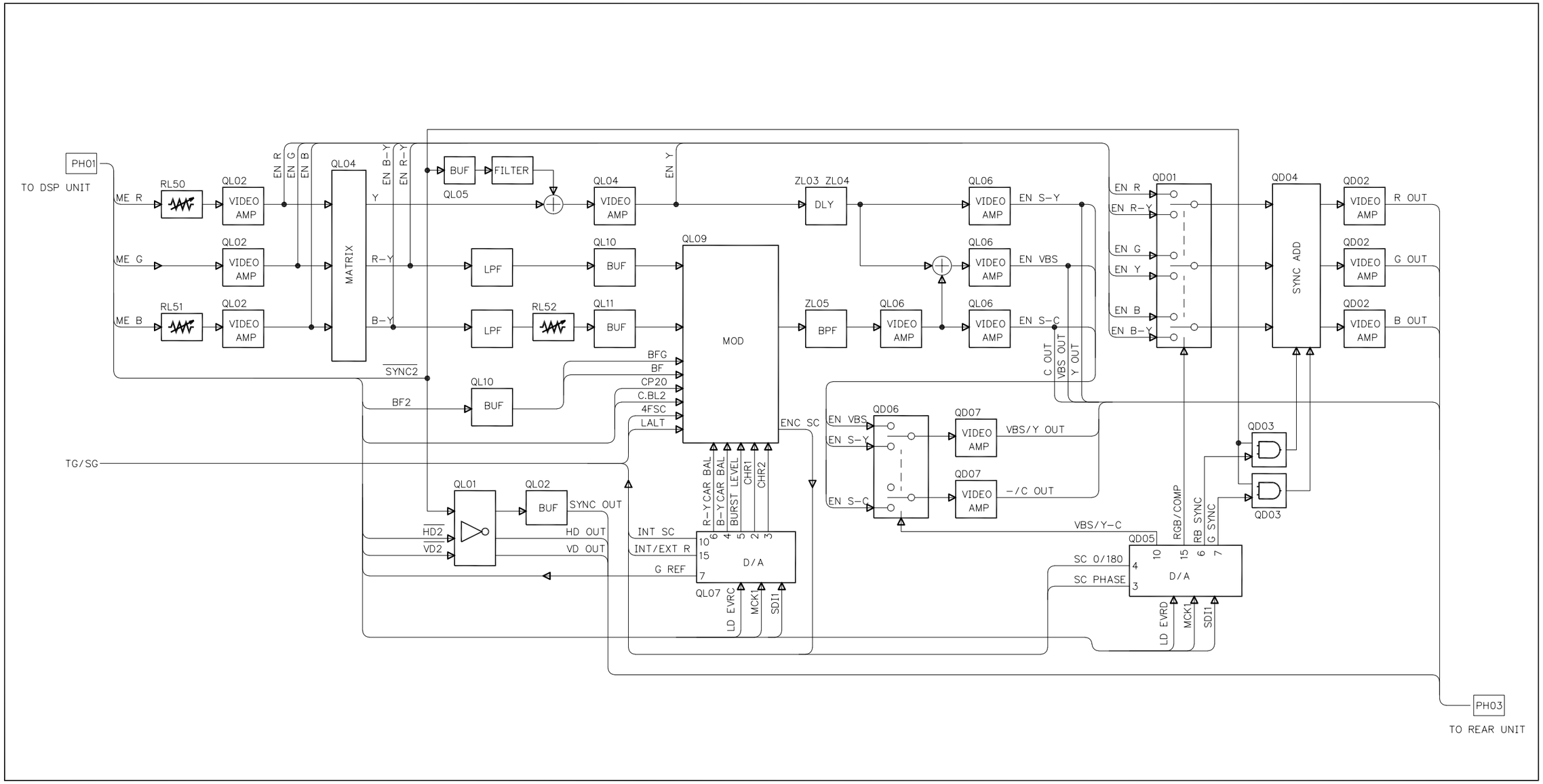
TG / SG



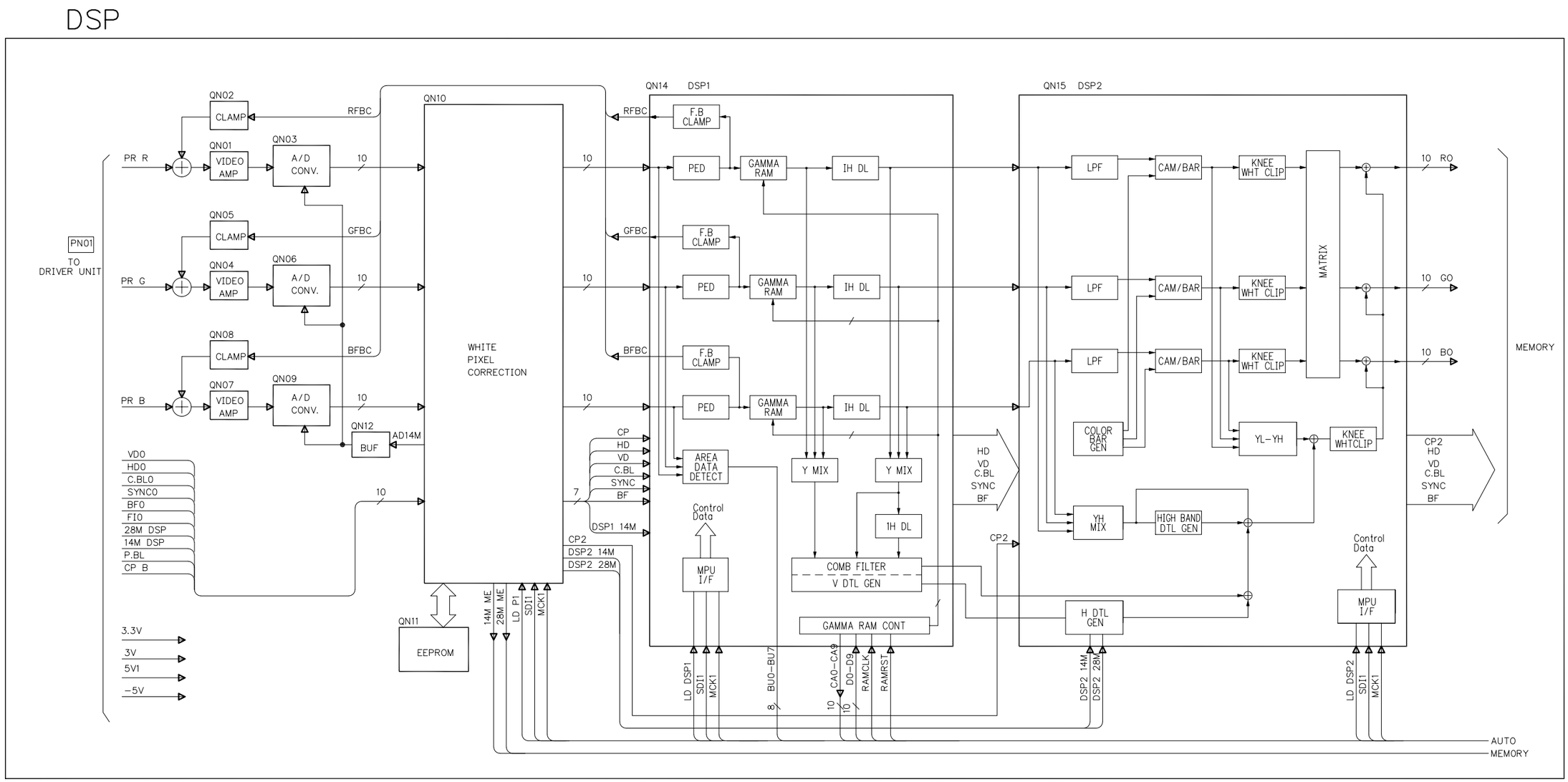
2-3. Pre Process Block Diagram



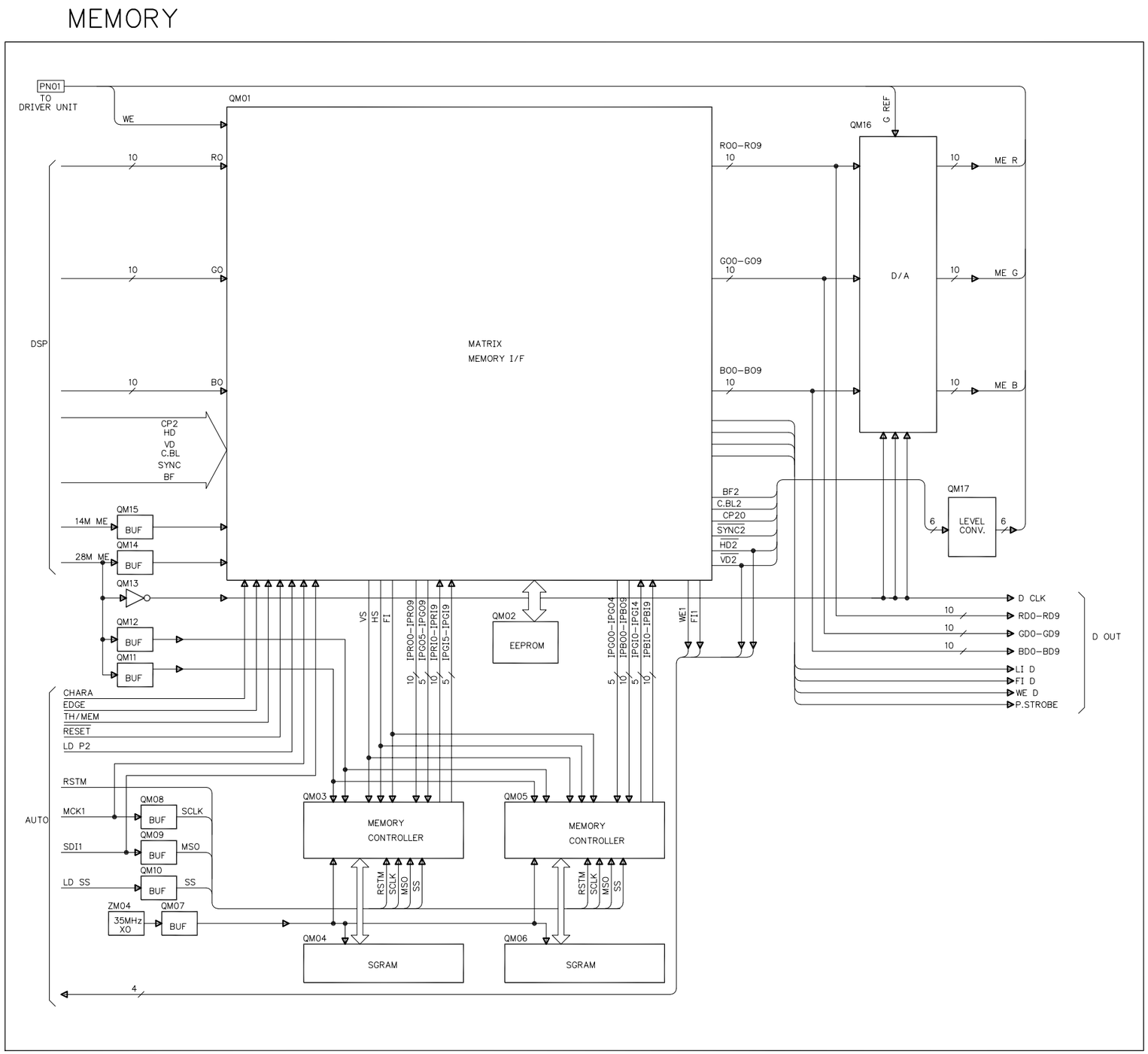
2-4. ENC/Output Block Diagram



2-5. DSP Block Diagram

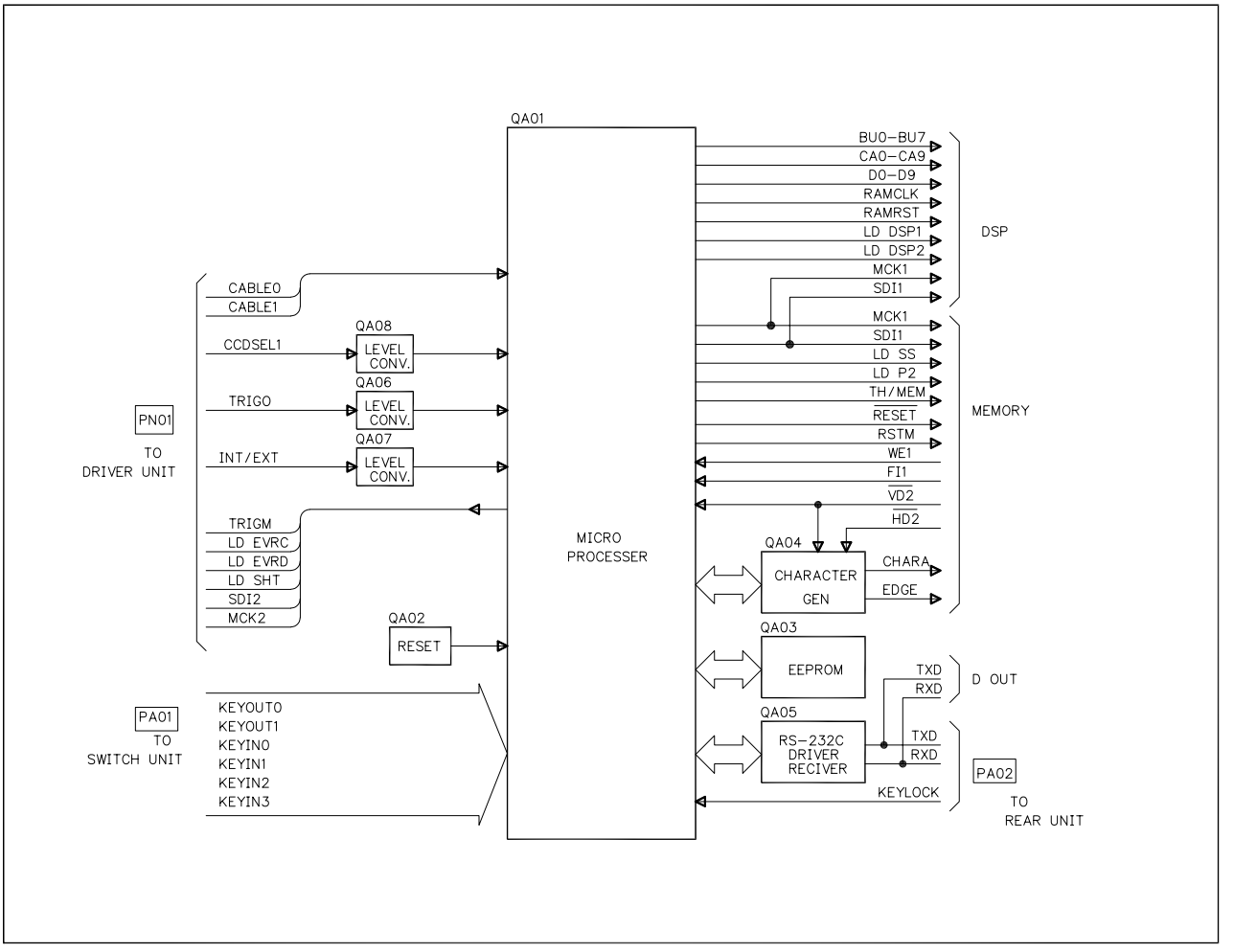


2-6. Memory Block Diagram

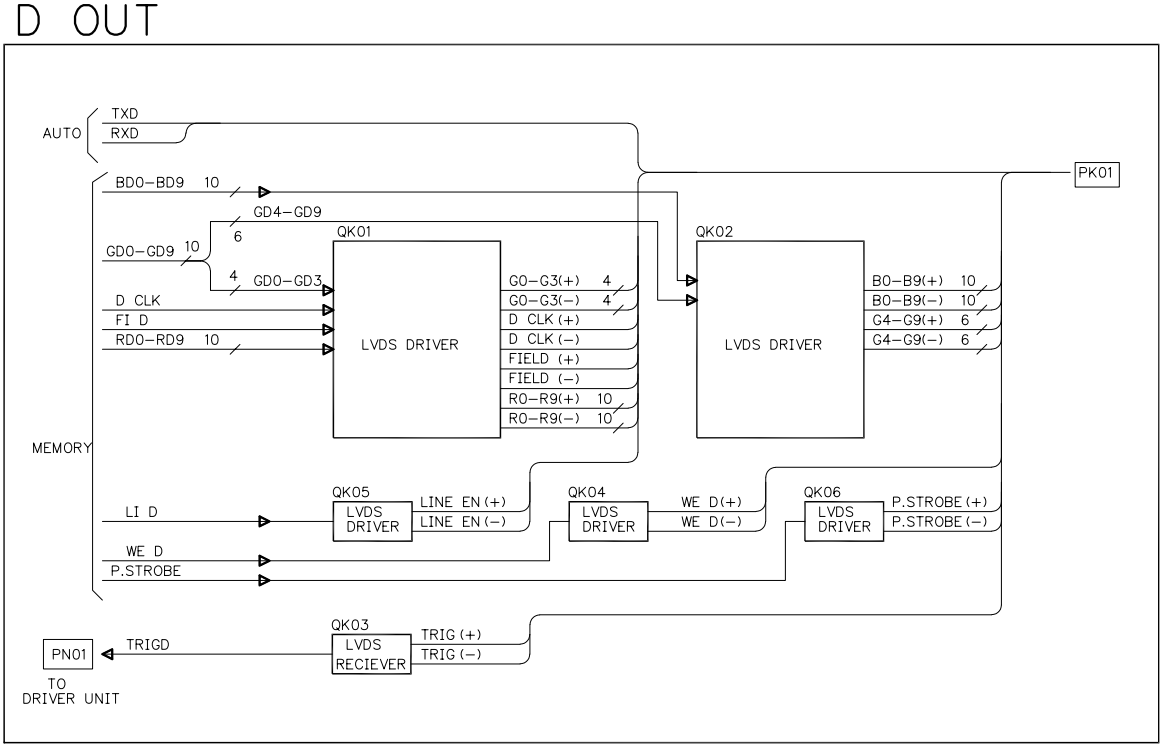


2-7. Auto Block Diagram

AUTO

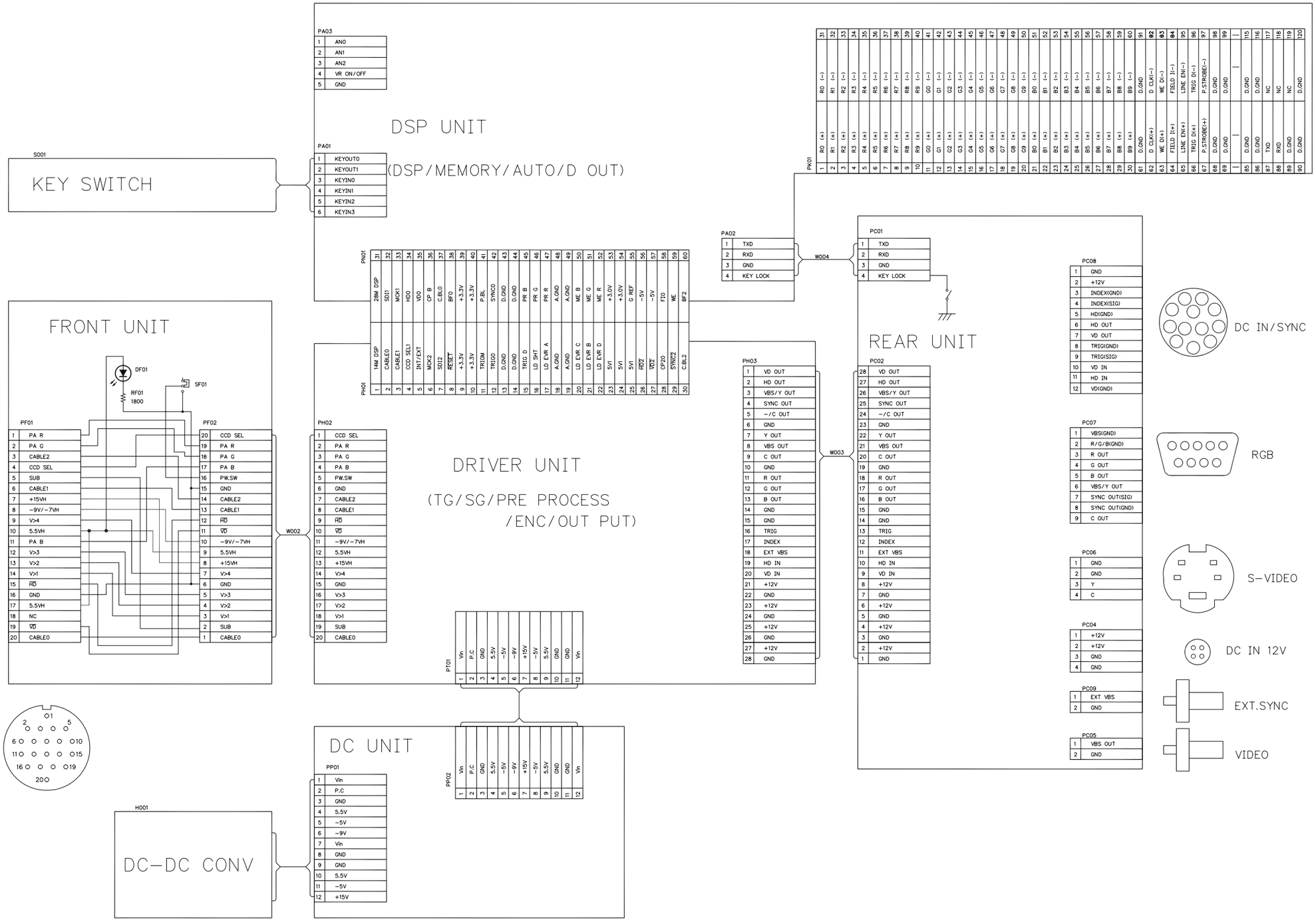


2-8. D Out Block Diagram

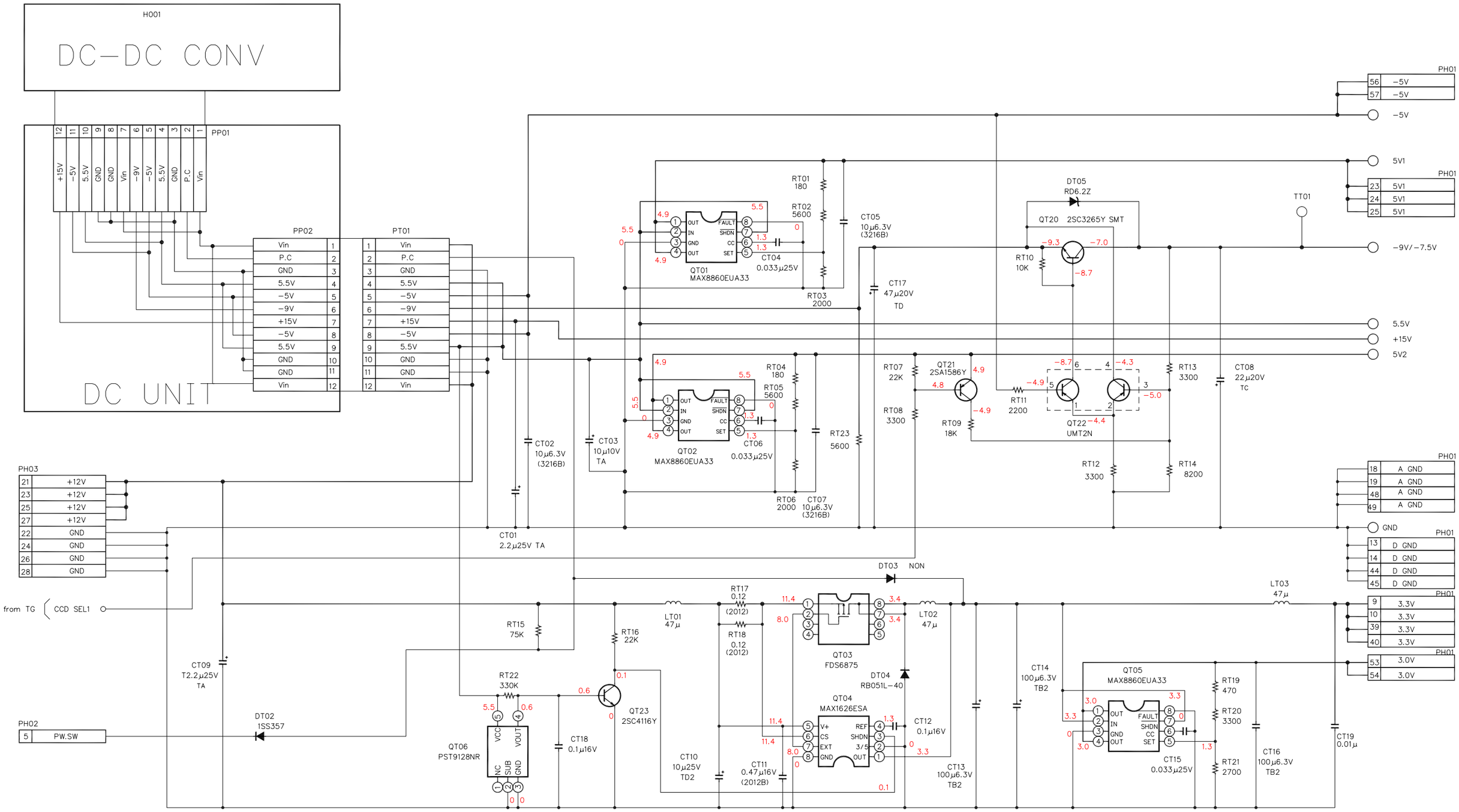


3. CIRCUIT DIAGRAMS

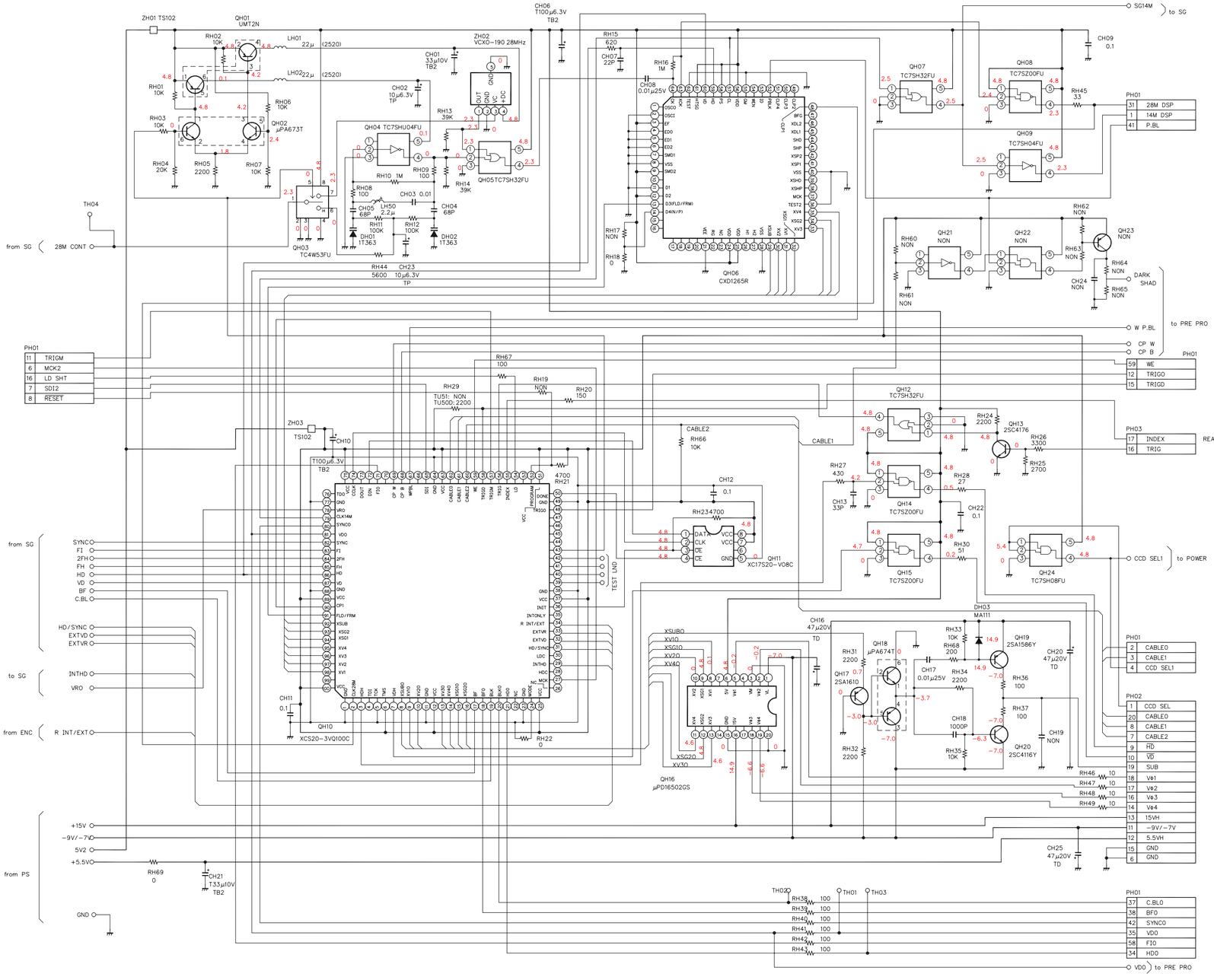
3-1. Overall Wiring Diagram



3-2. Power Supply Circuit Diagram

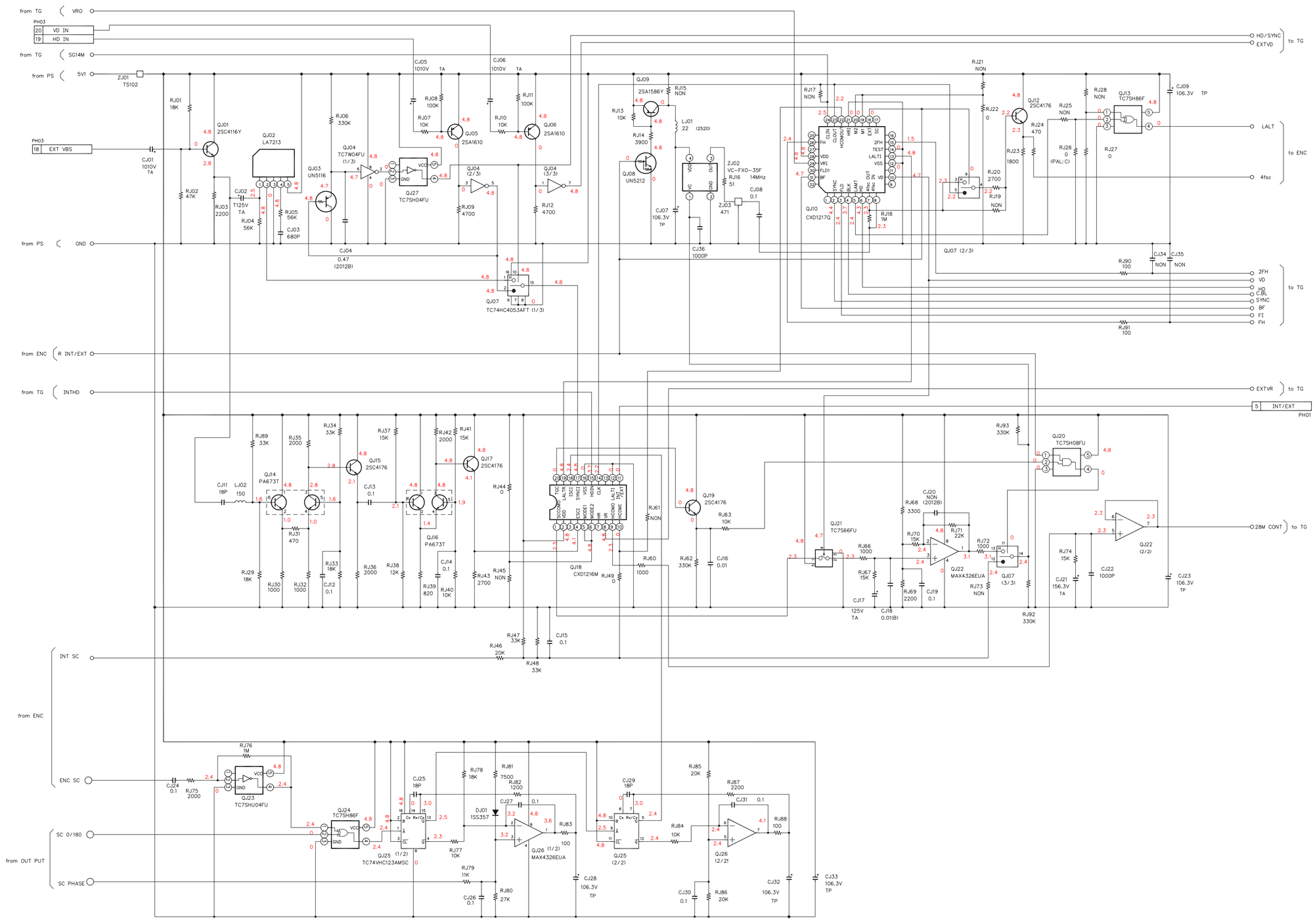


3-3. TG Circuit Diagram

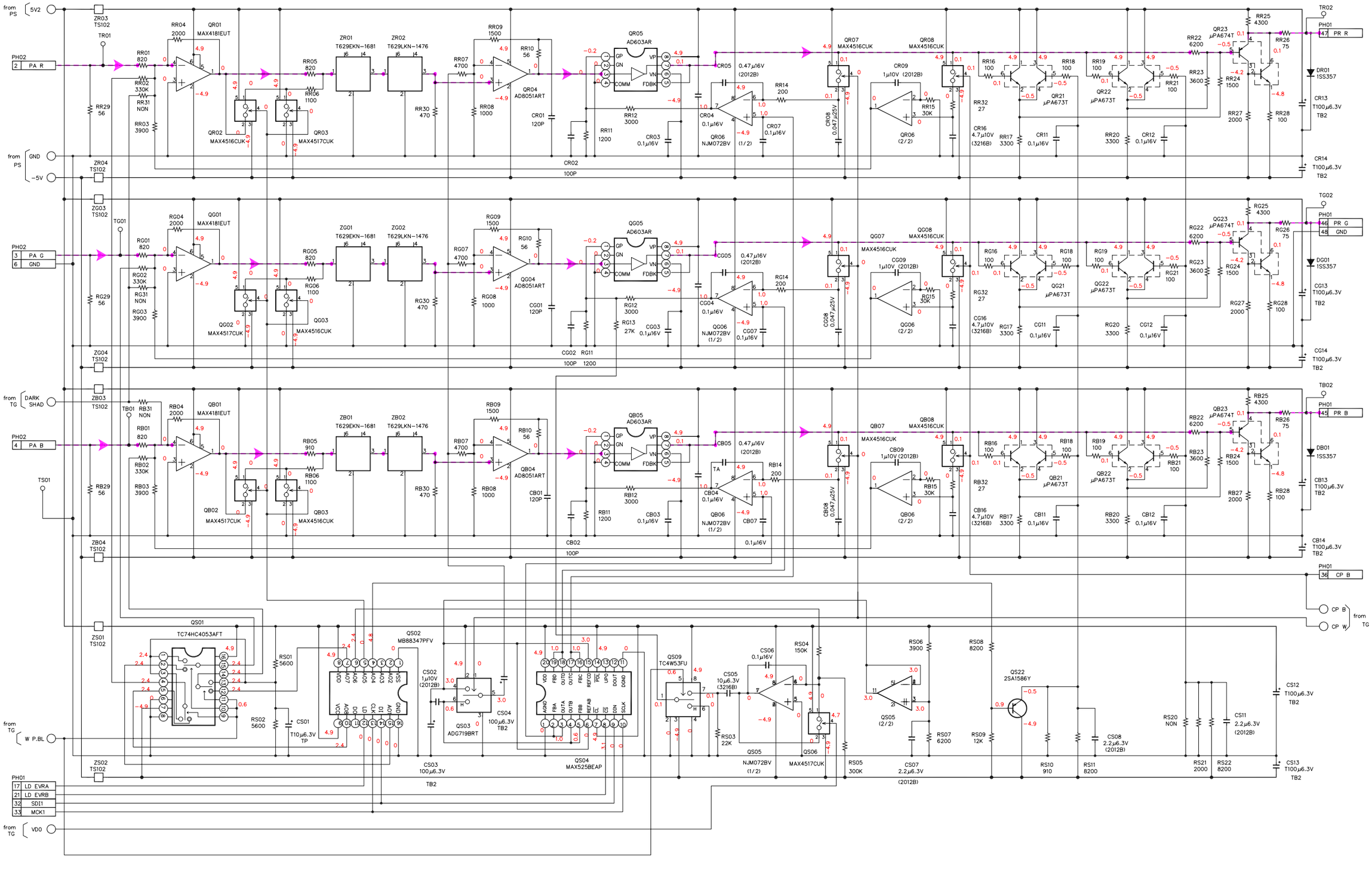


	RH29
TU51	NON
TU50D	2200

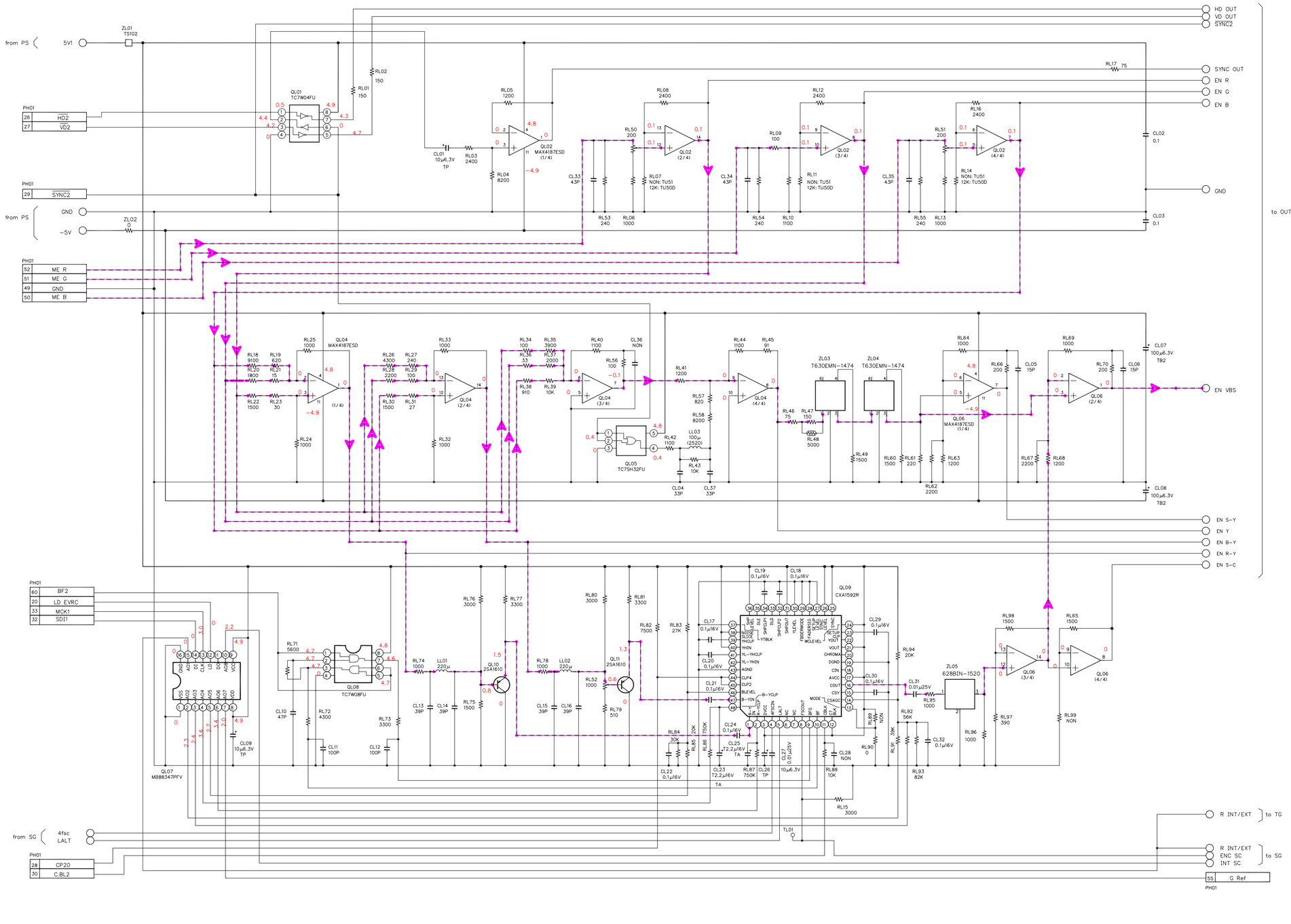
3-4. SG Circuit Diagram



3-5. Pre Process Circuit Diagram

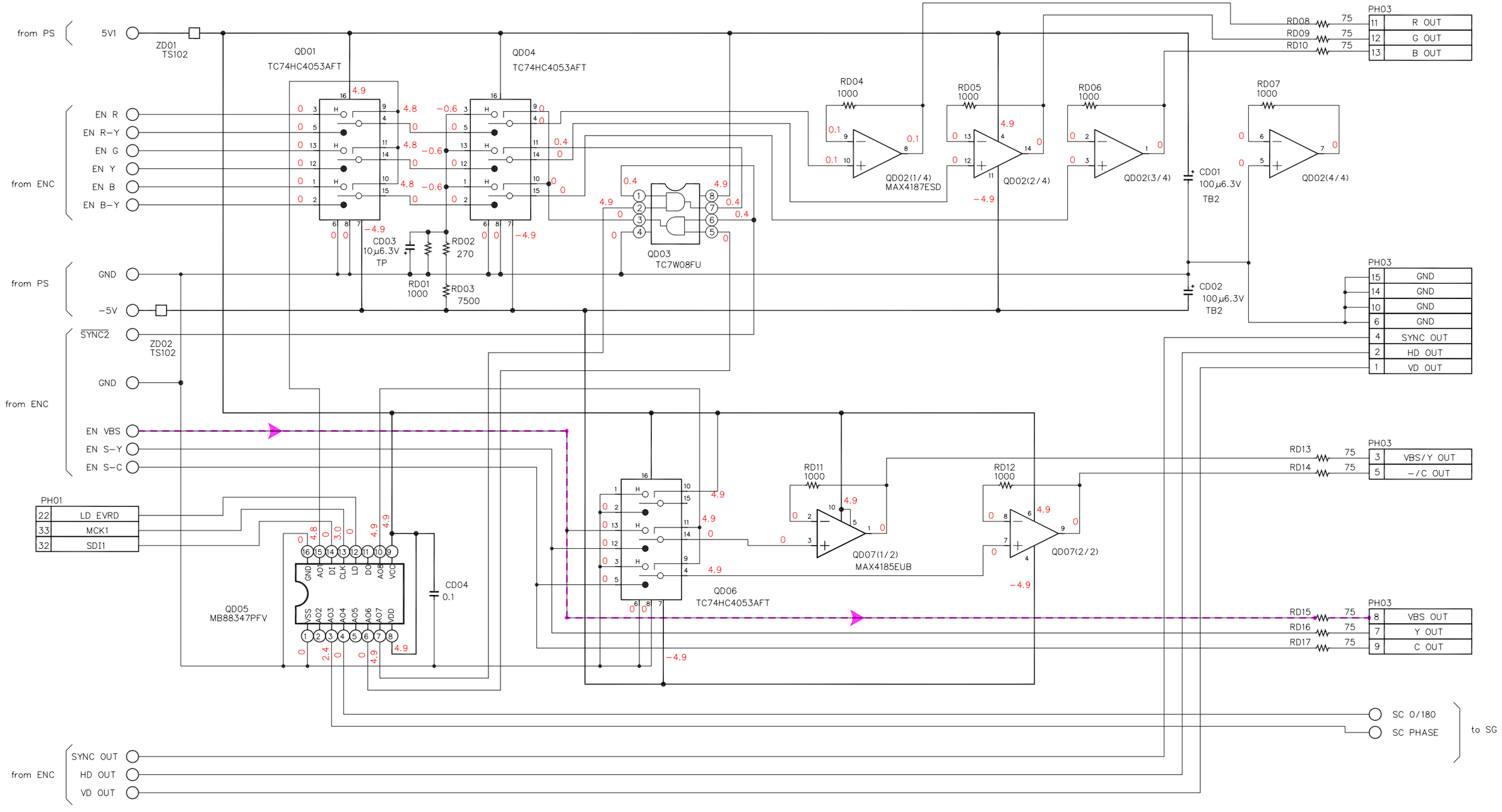


3-6. ENC Circuit Diagram

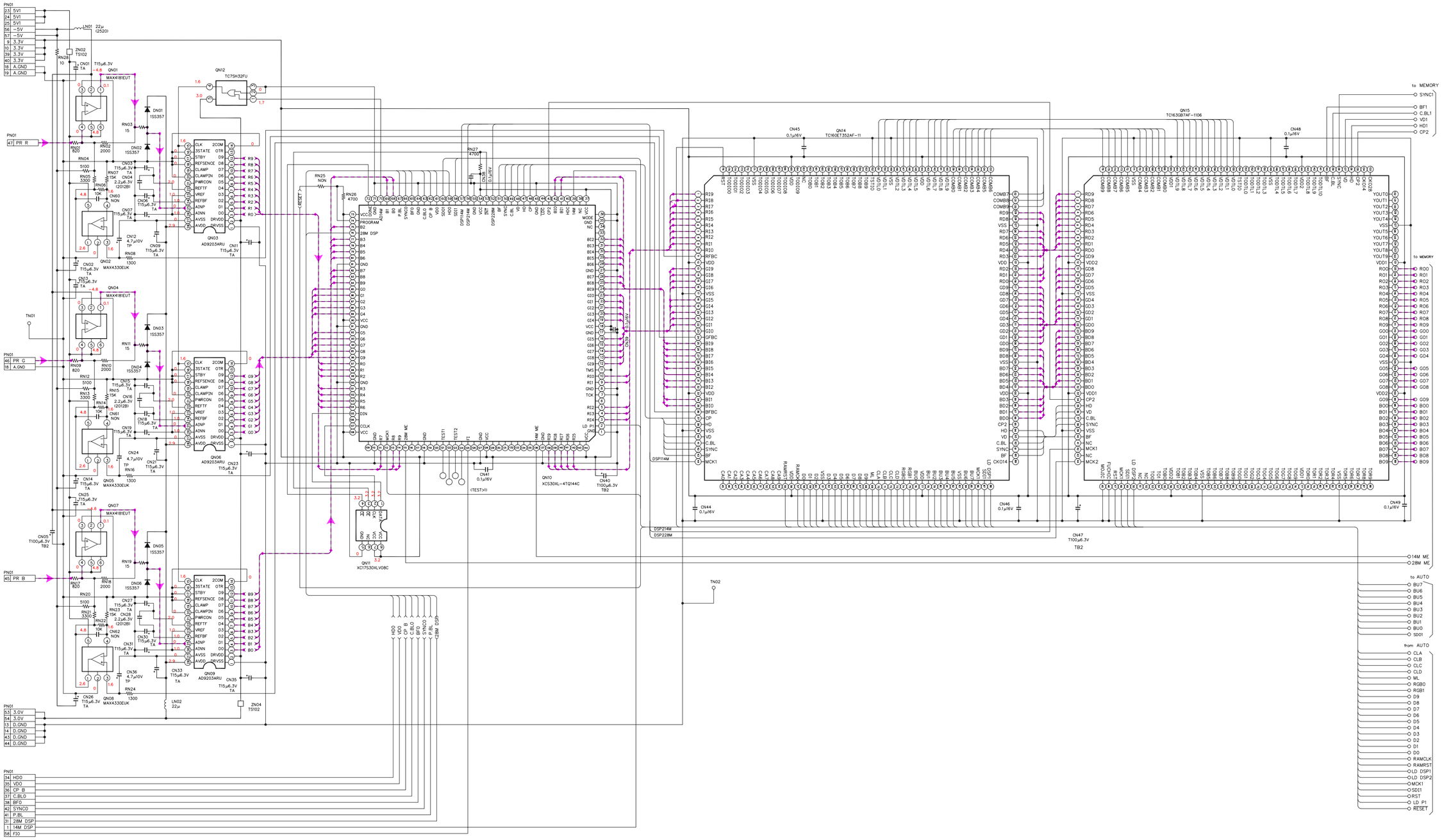


	RL07	RL11	RL14
TU51	NON	NON	NON
TU50D	12K	12K	12K

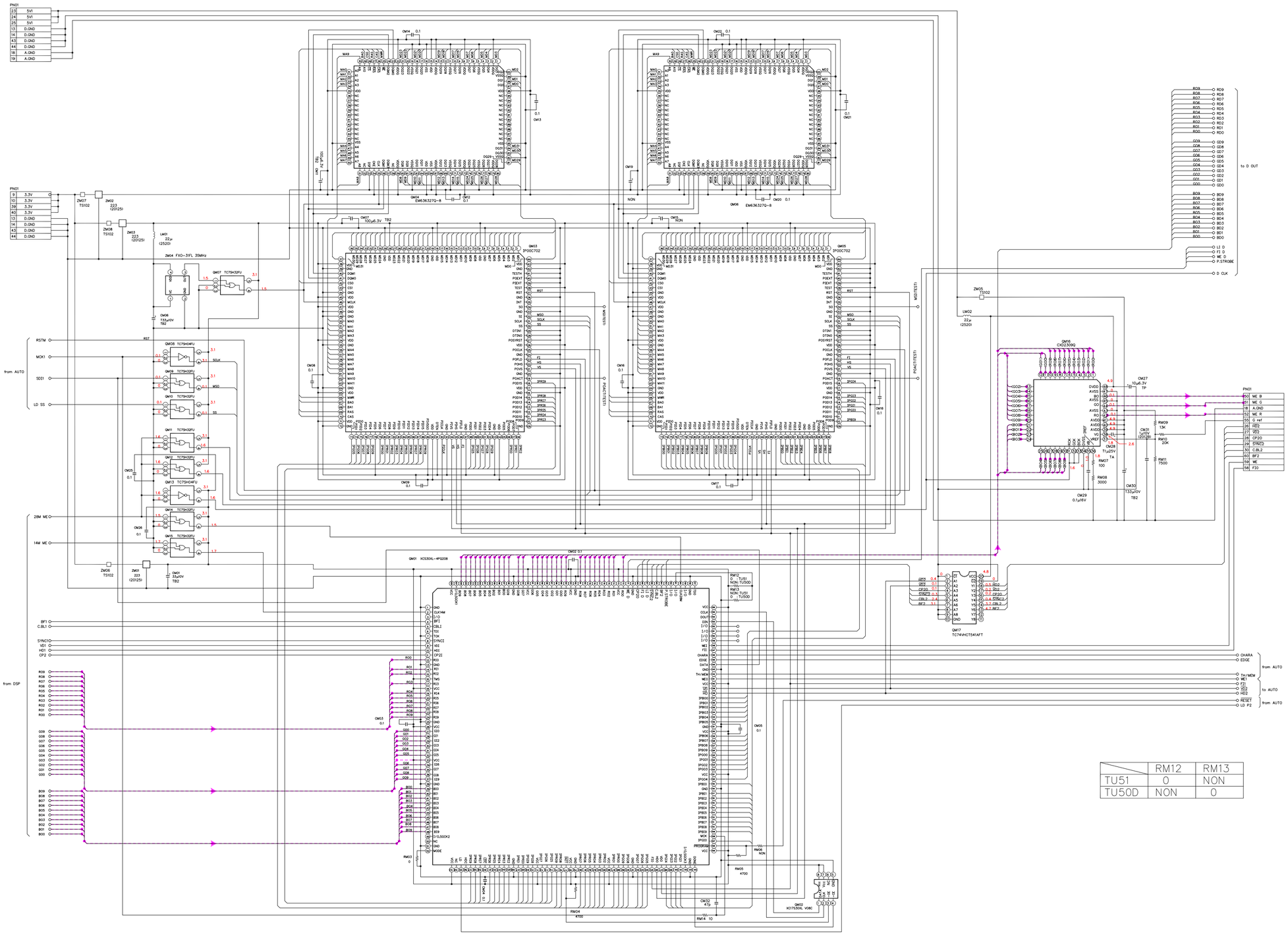
3-7. Output Circuit Diagram



3-8. DSP Circuit Diagram

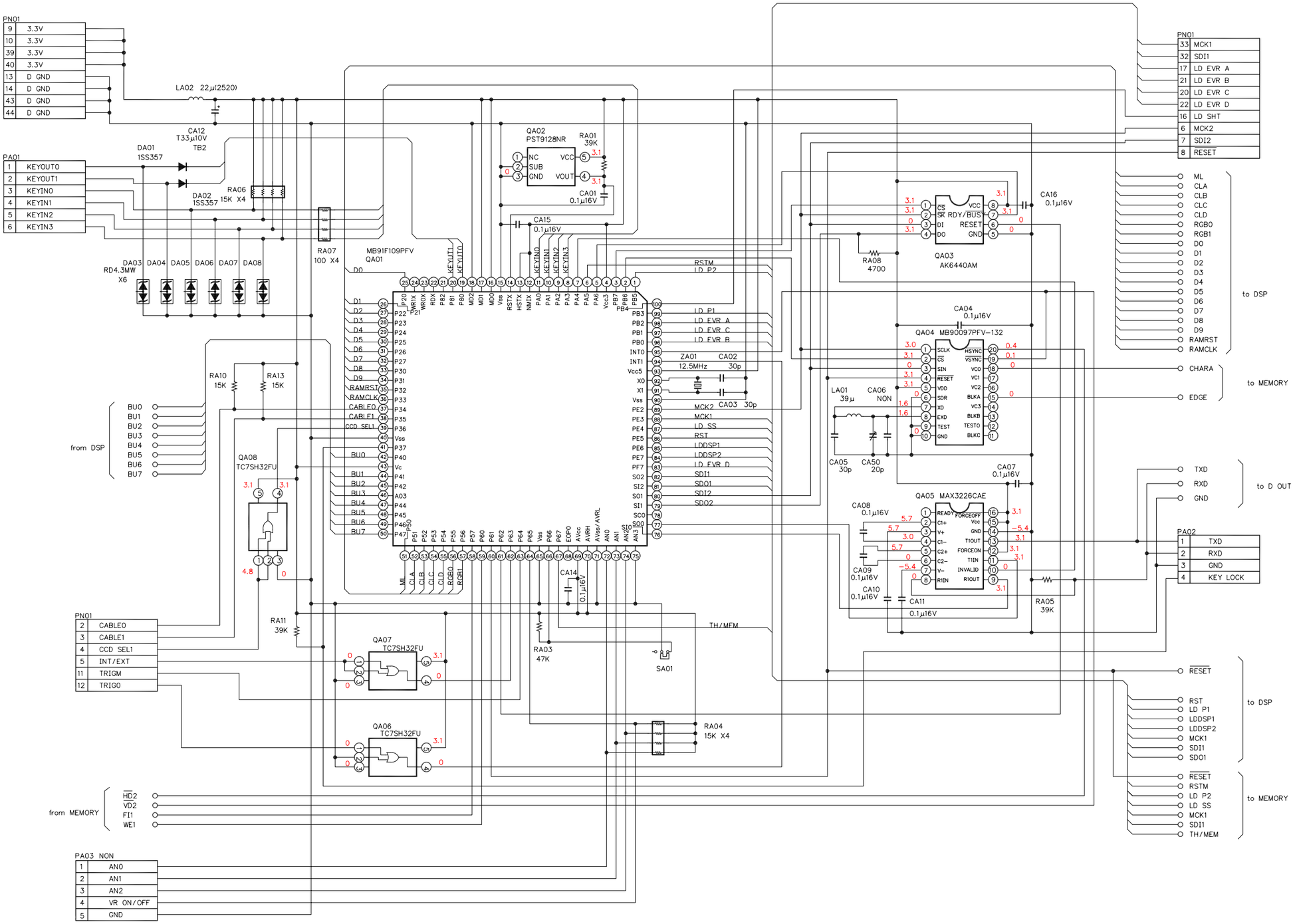


3-9. Memory Circuit Diagram

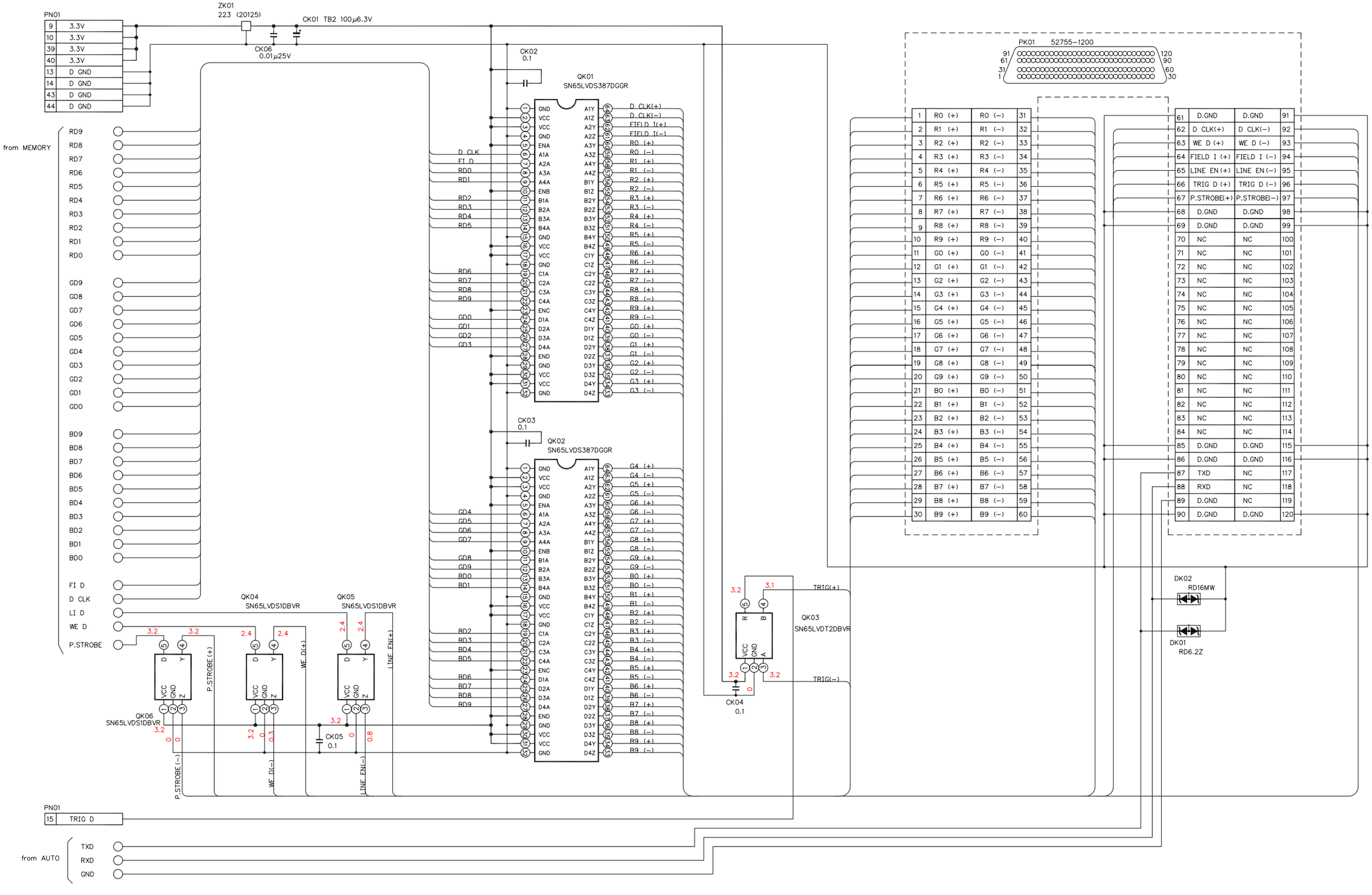


	RM12	RM13
TU51	0	NON
TU50D	NON	0

3-10. Auto Circuit Diagram



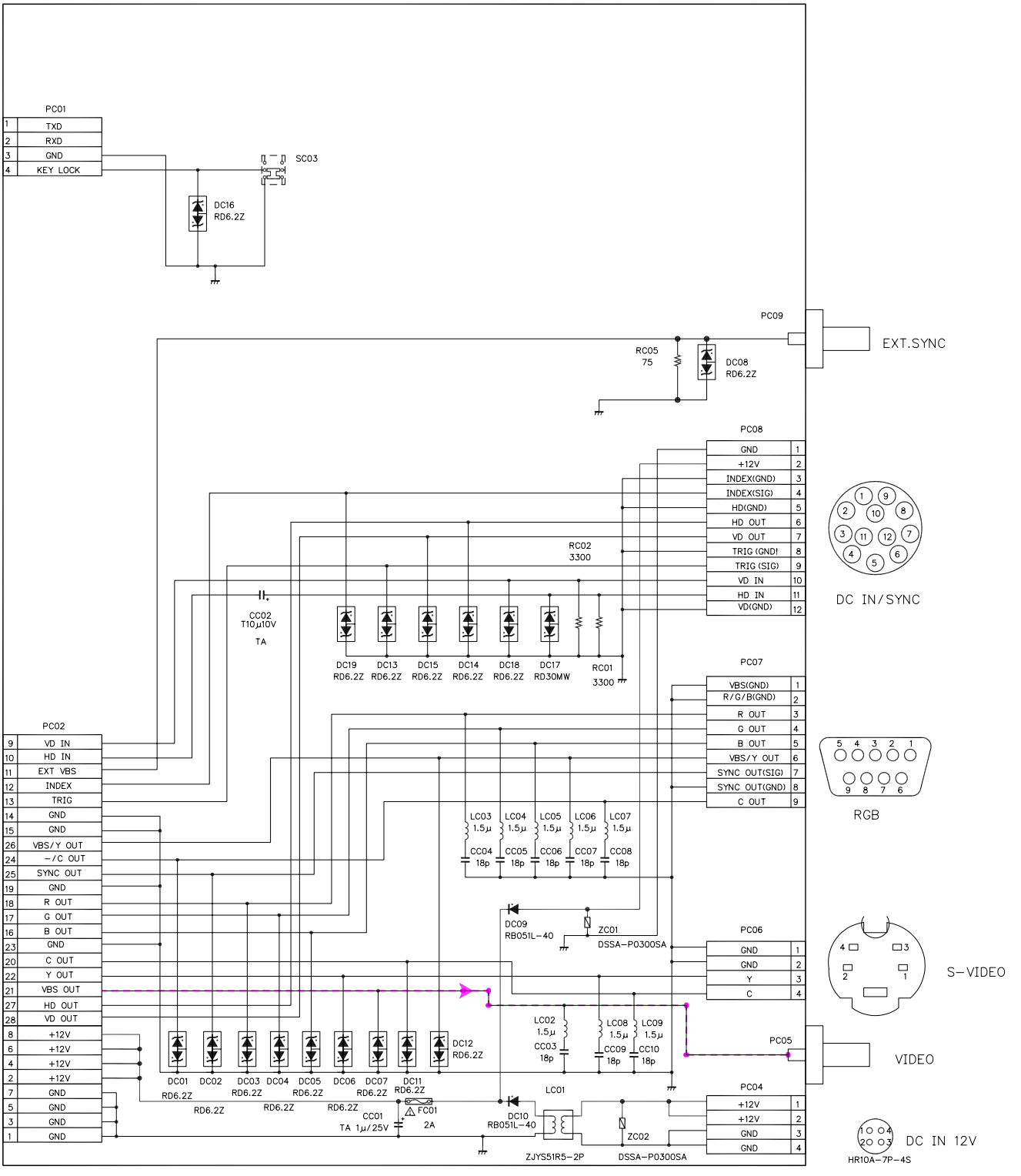
3-11. D Out Circuit Diagram



1	R0 (+)	R0 (-)	31
2	R1 (+)	R1 (-)	32
3	R2 (+)	R2 (-)	33
4	R3 (+)	R3 (-)	34
5	R4 (+)	R4 (-)	35
6	R5 (+)	R5 (-)	36
7	R6 (+)	R6 (-)	37
8	R7 (+)	R7 (-)	38
9	R8 (+)	R8 (-)	39
10	R9 (+)	R9 (-)	40
11	G0 (+)	G0 (-)	41
12	G1 (+)	G1 (-)	42
13	G2 (+)	G2 (-)	43
14	G3 (+)	G3 (-)	44
15	G4 (+)	G4 (-)	45
16	G5 (+)	G5 (-)	46
17	G6 (+)	G6 (-)	47
18	G7 (+)	G7 (-)	48
19	G8 (+)	G8 (-)	49
20	G9 (+)	G9 (-)	50
21	B0 (+)	B0 (-)	51
22	B1 (+)	B1 (-)	52
23	B2 (+)	B2 (-)	53
24	B3 (+)	B3 (-)	54
25	B4 (+)	B4 (-)	55
26	B5 (+)	B5 (-)	56
27	B6 (+)	B6 (-)	57
28	B7 (+)	B7 (-)	58
29	B8 (+)	B8 (-)	59
30	B9 (+)	B9 (-)	60

61	D.GND	D.GND	91
62	D CLK(+)	D CLK(-)	92
63	WE D (+)	WE D (-)	93
64	FIELD I (+)	FIELD I (-)	94
65	LINE EN(+)	LINE EN(-)	95
66	TRIG D (+)	TRIG D (-)	96
67	P.STROBE(+)	P.STROBE(-)	97
68	D.GND	D.GND	98
69	D.GND	D.GND	99
70	NC	NC	100
71	NC	NC	101
72	NC	NC	102
73	NC	NC	103
74	NC	NC	104
75	NC	NC	105
76	NC	NC	106
77	NC	NC	107
78	NC	NC	108
79	NC	NC	109
80	NC	NC	110
81	NC	NC	111
82	NC	NC	112
83	NC	NC	113
84	NC	NC	114
85	D.GND	D.GND	115
86	D.GND	D.GND	116
87	TXD	NC	117
88	RXD	NC	118
89	D.GND	NC	119
90	D.GND	D.GND	120

3-12. Rear Circuit Diagram



SECTION 5
SPECIFICATIONS

1. SPECIFICAIONS

IK-TU51CU

Power supply	DC12V±10%	
Power consumption	Approx. 7.8W (including a camera head)	
Pick-up system	RGB, 3CCD, Micro prism system	
Available image sensor (Effective pixels)	1/2 inch, 1/3inch IT−CCD (Horizontal: 768pixels, Vertical: 494pixels)	
Scanning system	2:1 interlace	
Scan frequency	Horizontal: 15.734kHz, Vertical: 59.94Hz	
Sync system	Internal/External(Automatic switching)	
Horizontal resolution	JK-TU52H connection: 800TV lines JK-TU53H connection: 750TV lines	
Sensitivity	F11 standard (2000 lx, 3000K)	
Minimum illumination	4 lx (F2.2, Sensitivity+20dB, 3000K)	
SN ratio	64dB standard	
Lens mount	C mount(flange back: 17.526mm in-air)	
Ambient temperature	32 to 104° F (0 to 40℃)	
Ambient humidity	Less than 90%	
Weight	Approx. 1.57 lbs(710g)	
External dimension	4.33"(W) × 1.57"(H) × 6.14(D) (110(W) × 40(H) × 156(D)mm) (except for protruded portion)	
Scene file(user memories)	A, B, C	
White balance	ATW (Automatic tracing balance), AWB (Automatic white balance), MANUAL (Manual)	
Gain	AUTO (Automatic gain control), MANUAL (Manual), OFF (0dB)	
Output signal	VBS: 75Ω unbalanced, BNC connector, NTSC standard Y/C: 75Ω unbalanced, S terminal RGB or $Y/P_R/P_B$: 75Ω unbalanced, D sub 9 pin connector VBS or Y/C: 75Ω unbalanced, D sub 9 pin connector	
External sync input	VBS/BS: 75Ω unbalanced, Sync negative, BNC connector SYNC 0.286V±0.1V, Burst 0.286V±0.1V HD or VD: 2−5V(p−p) Negative	
Sync signal output	SYNC: 2.5V±1V(p−p) 75Ω unbalanced HD, VD, INDEX: $5V^{+0.5}_{-1.0}$ V(p−p), Negative, Load impedance: More than 10kΩ	
External trigger input	TRIGGER: Low level: Less than 0.4V, High level: 3.4−5V 1 Pulse: Positive/Negative selectable 2 Pulse: Positive/Negative/Width selectable	
Interface	Serial data interface (RS-232C)	
	Digital signal interface (LVDS)	TRIG (input) RGB (output): 10bit × 3 PIXEL CLK (output) FIELD ID (output) LINE EN (output) FRAME EN (output)
Ooptional parts	JK-TU52H (1/2 inch 3CCD camera head) JK-TU53H (1/3 inch 3CCD camera head) EXC−T503(Camera cable (3m)), EXC−T506(Camera cable (6.5m)) EXC−T510(Camera cable (10m)), EXC−T530(Camera cable (30m)) EXC−T505RGB(RGB cable), JK−KTU5(Camera head tripod base)	

●Design and specifications are subject to change without notice.

JK-TU52H

Image sensor	1/2inch IT-CCD
Effective pixels	Horizontal: 768 pixels, Vertical: 494 pixels
Horizontal resolution	800TV lines
Sensitivity	F11 standard (2000 lx,3000K)
Minimum illumination	4 lx (F2.2, Sensitivity + 20dB,3000K)
SN ratio	64dB standard
Lens mount	C mount(flange back:17.526mm in-air)
Ambient temperature	32 to 104° F (0℃ to 40℃)
Ambient humidity	Less than 90%
Weight	Approx. 2.82 oz (80g)

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JK-TU53H

Image sensor	1/3inch IT-CCD
Effective pixels	Horizontal: 768 pixels, Vertical: 494 pixels
Horizontal resolution	750TV lines
Sensitivity	F11 standard (2000 lx,3000K)
Minimum illumination	4 lx (F2.2, Sensitivity + 20dB,3000K)
SN ratio	64dB standard
Lens mount	C mount(flange back:17.526mm in-air)
Ambient temperature	32 to 104° F (0℃ to 40℃)
Ambient humidity	Less than 90%
Weight	Approx. 1.94 oz (55g)

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